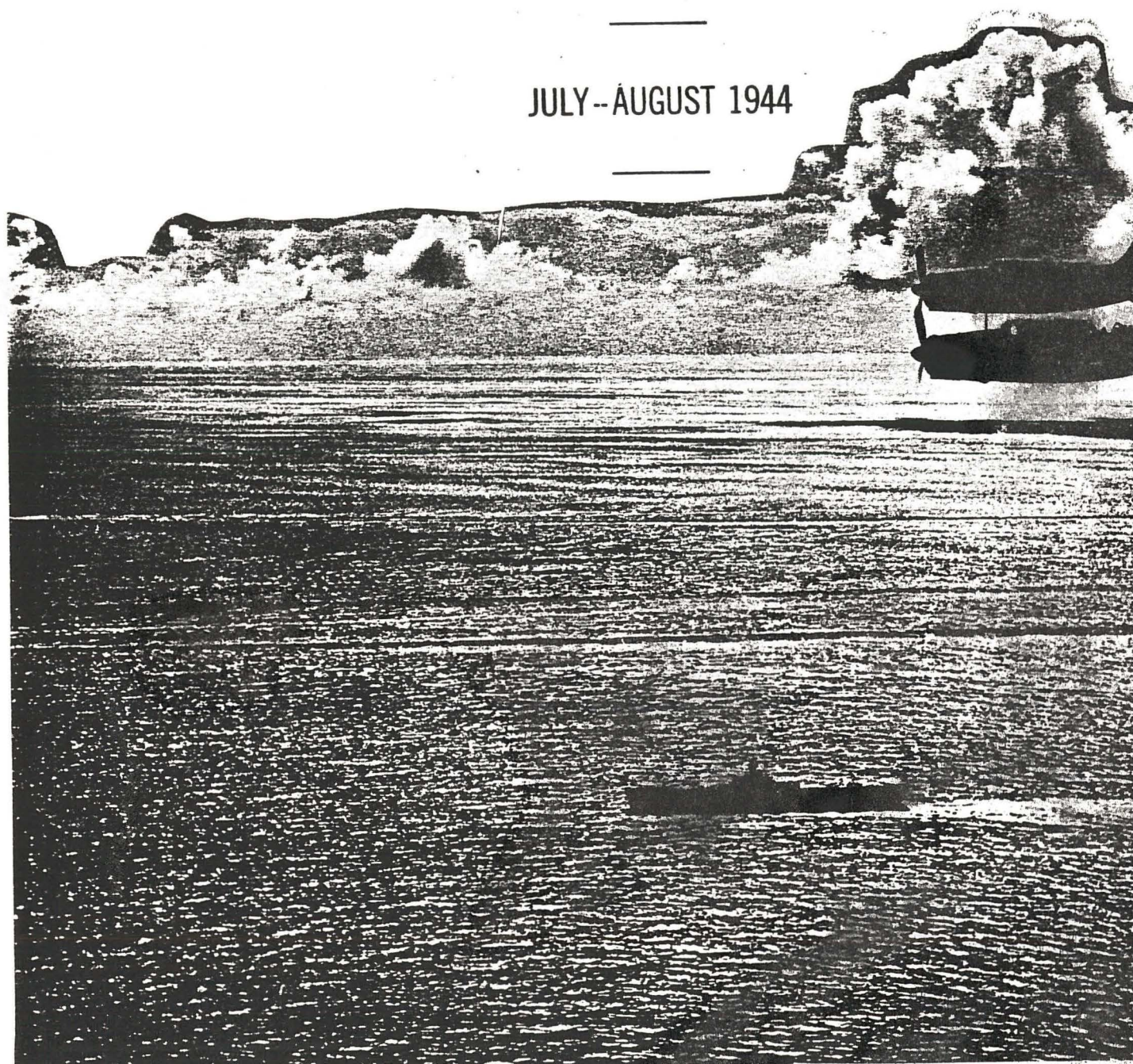


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ANALYSIS OF CARRIER OPERATIONS

JULY--AUGUST 1944



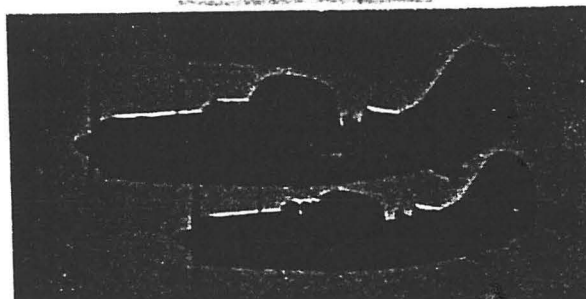
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ANALYSIS
OF
CARRIER OPERATIONS

JULY--AUGUST 1944



COMMANDER AIR FORCE, PACIFIC

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UNITED STATES PACIFIC FLEET
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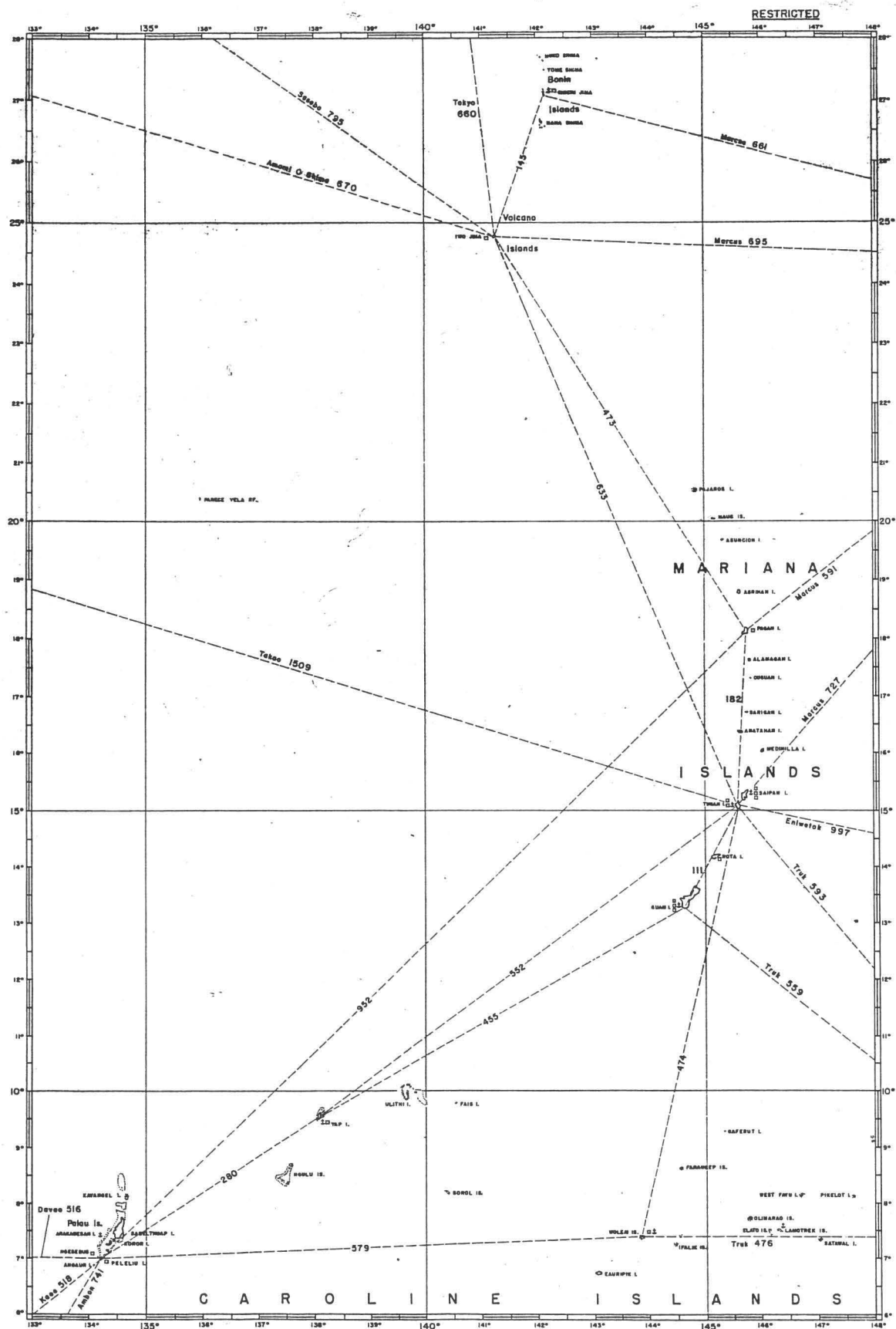
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SCHEDULE OF FAST CARRIER OPERATIONS, JULY-AUGUST, 1944

<u>DATE</u>	<u>TG 58.1</u>	<u>TG 58.2</u>	<u>TG 58.3</u>	<u>TG 58.4</u>
	HORNET YORKTOWN (7/1-7/29) FRANKLIN (7/29-8/8) BATAAN (7/1-7/12) CABOT (7/13-8/8)	WASP FRANKLIN (7/1-7/29) MONTEREY (7/1-7/23) CABOT (7/1-7/13)	LEXINGTON ENTERPRISE (7/1-7/9) BUNKER HILL (7/9-8/8) SAN JACINTO PRINCETON (7/1-7/9)	ESSEX LANGLEY COWPENS (7/1-7/9) PRINCETON (7/9-7/30) BELLEAU WOOD (8/2-8/12)
1-2 July	Enroute Bonins	Enroute Bonins	Attack Guam, Rota	Attack Guam, Rota
3	Attack Iwo Jima	Enroute Bonins	Attack Guam, Rota	Attack Guam, Rota
4	Attack Bonins	Attack Iwo Jima	Attack Guam, Rota	Enroute Eniwetok
5	Attack Pagan	Attack Pagan	Attack Guam, Rota	Enroute Eniwetok
6-7	Attack Guam, Rota	Attack Guam, Rota	Enroute Eniwetok	At Eniwetok
8-13	Attack Guam, Rota	Attack Guam, Rota	At Eniwetok	At Eniwetok
14-17	Attack Guam, Rota	Attack Guam, Rota	Enroute Marianas	Enroute Marianas
18-21	Attack Guam, Rota	Attack Guam	Attack Guam	Attack Guam
22	Rearming	Attack Guam	Off Guam	Off Guam
23	Enroute Yap	Rearming	Off Guam	Attack Tinian
24	Enroute Yap	Enroute Palau	Enroute Palau	Attack Tinian
25-27	Attack Yap	Attack Palau	Attack Palau	Attack Guam
28	Attack Yap	Enroute Saipan	Enroute Saipan	Attack Guam
29	Enroute Saipan	Enroute Saipan	Enroute Saipan	Attack Guam
30	Enroute Saipan	<u>Enroute Eniwetok</u>	Off Guam	Off Saipan
31-2	Off Guam		Off Guam	Attack Guam
3	Enroute Bonins		Enroute Bonins	Attack Guam
4-5	Attack Bonins		Attack Bonins	Attack Guam
6-8	<u>Enroute Eniwetok</u>		<u>Enroute Eniwetok</u>	Attack Guam
9-10				Off Guam
11				Enroute Eniwetok



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I. SUMMARY

The following is a condensed summary of carrier air operations during July and early August (excluding TG 58.3 and 58.4 operations through July 5, previously reported). More detailed statistics of sorties, bomb expenditures, enemy planes destroyed, and own plane losses, will be found in Section VI, at the end of this report.

TARGET	COMBAT SORTIES		TONS OF BOMBS	ENEMY A/C SHOT DOWN	OWN LOSSES
	VF	VB-VT			
TOTAL MARIANAS	5043	4333	3087	12	42
Saipan (1-8 July)	272	87	40	-	1
Guam (6 July-8 Aug.)	3906	3628	2661	2	29
Tinian (1-30 July)	481	350	205	-	7
Rota (6-28 July)	356	256	167	1	3
Other Marianas	28	12	14	9	2
Palau-Yap-Ulithi	786	881	630	6	14
Iwo Jima	240	208	150	83	18
Bonins	164	159	112	11	6
Shipping	434	580	434	2	16
GRAND TOTAL	6667	6161	4413	114	96

The scale of operations recorded during June was maintained throughout July. CVs and CVLs flew an average of 332 combat sorties per day during the last 20 days of June; for the 31 days of July their average was 298 combat sorties per day. CVEs, which averaged 62 combat sorties per day during the last 16 days of June, averaged 80 daily for July. In August the volume fell off abruptly; only one fast carrier group remained in the Marianas, only 21 CVE combat sorties were flown, and the Bonins strike by two carrier groups was the only significant operation of the month. On seven days during July (as against only 3 in June) over 900 combat sorties per day were flown from carriers, reaching a peak of over 1300 on the 20th, W-day at Guam. 400 or more sorties were flown on 5 additional days. CVEs flew over 150 combat sorties daily on 6 days, beginning the day before the Tinian landings, and reaching a peak of over 250.

Destruction of enemy aircraft during July and August fell off greatly from the record totals of June. Only 114 were shot down by carrier planes, and none by AA; 90 of the 114 were destroyed during the Iwo Jima-Bonins raid of 3-4 July. Only 14 enemy aircraft were engaged in the Marianas during July; the last enemy raid in the area was on the night of 7 July. In addition to the 114 destroyed in the air, carrier forces destroyed 100-110 grounded planes in July and August, principally at Iwo Jima and Palau. A full count of enemy planes destroyed by naval forces from 11 June to 8 August appears at the end of this report.

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Our July attacks, unlike those in June, were highly concentrated. 60 percent of the bomb tonnage dropped in July-August was on Guam, for a total of 2661 tons, whereas only 687 tons, 26 percent of the June total, were dropped in preparation for and support of the Saipan assault. Since Guam had also been heavily pounded in June, by 881 tons (a total of 3542 for the entire operation) it easily takes first place as principal victim of our carrier assaults to date. Nearly 10,000 carrier-based sorties have been flown against Guam; 4427 of them during the 4-day period from W-2 day to W plus 1 day.

In general the July-August record is thus principally the record of Guam. As the chart on a subsequent page indicates, the island was constantly under moderate attack by one or two task groups from 1 July to 17 July. These groups kept the airfields neutralized (the Rota field also), and hit other targets, including guns, towns, dumps and other installations. From the 18th to the 21st all four fast carrier groups devoted full strike schedules to Guam, aided by CVEs. The terrific sustained concentration on Guam is shown by the chart. From the 22nd on, one group, plus CVEs, kept up the pressure until early in August, with some diversion of their effort to the Tinian campaign.

The Tinian assault received less direct support from carriers than Saipan or Guam. One fast carrier group devoted two days to the island, and some CVEs assisted, but most of the air support came from Saipan-based P-47s. Northern Tinian was also heavily pounded by artillery on Saipan, only 4 or 5 miles distant. Tinian was the least heavily defended of the three islands, and the enemy resistance there appeared to have little organization left when the Marines landed.

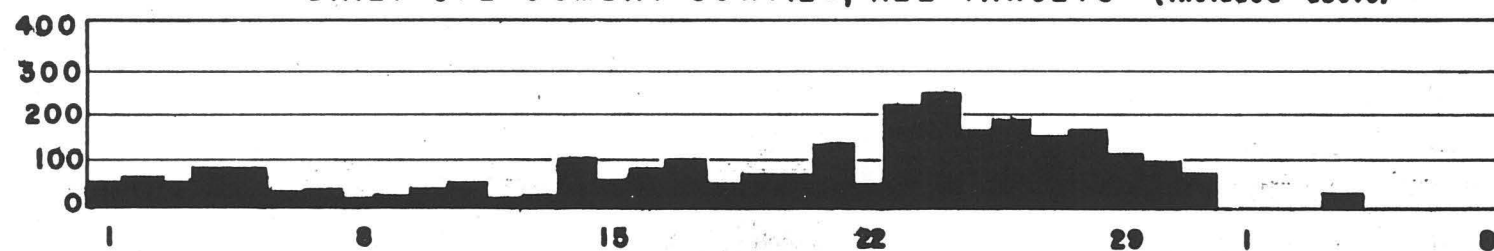
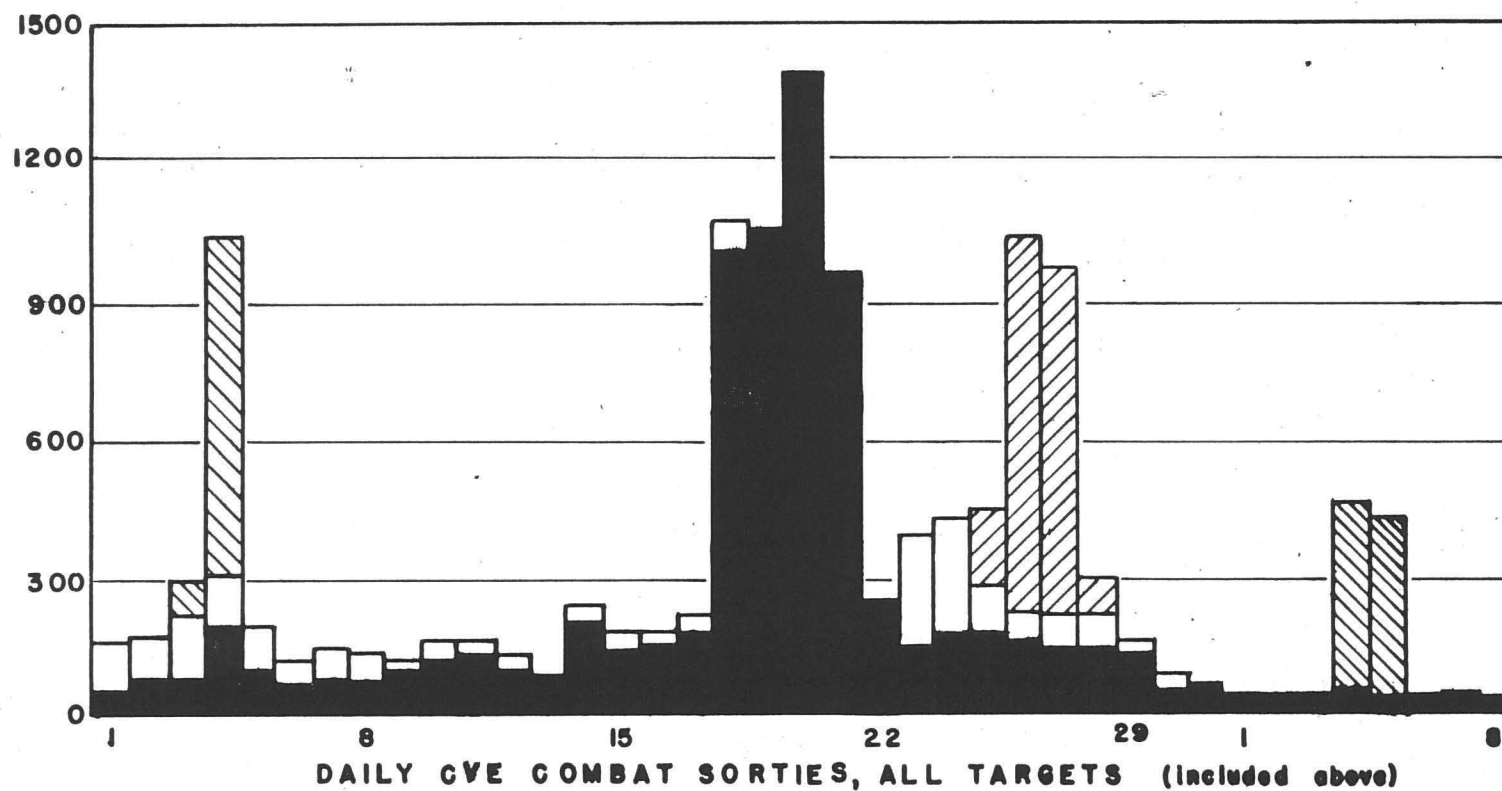
In July and August much less effort was spent in neutralizing airfields than in June, and more in demolishing installations offering opposition to our ground forces. (A more detailed account of these operations will be found in Section II.) Thus the problems mentioned in the Analysis with respect to the June operations against airfields did not again occur.

A major part of the credit for preventing enemy air activity in the Marianas in July and early August, and consequently for reducing the volume of airfield neutralization attacks, must be given to the heavy losses inflicted by carrier planes on the enemy airforce at Iwo Jima on 24 June and 3-4 July, the pounding administered to Yap by SoWesPac B-24s from 22 June to 23 July and from 2 August to 10 August, and the Palau-Yap carrier strikes of 25-28 July. The 24 June sweeps and interceptions accounted for 114 enemy planes, the 3-4 July raids accounted for 90 in the air and possibly 50-60 on the ground, the Palau-Yap strikes over 60, largely on the ground, for a total of over 300. SoWesPac bombers at Yap shot down 70 VF and destroyed other planes on the ground. This heavy attrition inflicted on staging and depot bases is important not only because it destroys aircraft, but because it disorganizes the enemy's defense plans and his operational units, makes him reluctant to risk reinforcements in the area, and forces him to commit additional forces to the defense of the staging bases. Since 4 July the enemy has maintained only nominal defensive forces at Iwo Jima (sufficient to impose some losses on our B-24s), and subsequent to 25 July has kept no operational planes at Yap and only small forces at Palau.

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DAILY COMBAT SORTIES, ALL CARRIERS, 1 JULY - 8 AUGUST

■ GUAM □ OTHER MARIANAS ▨ IWO JIMA, BONINS ▩ YAP, PALAU



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Interdiction raids of this sort have long been a major factor in the success of SoWesPac air operations. They contributed largely to the safety of the Marshalls operations, and most recently, in the carrier raids on the Philippines, to the Morotai-Palau campaign. It appears that their paralyzing effect on the enemy air force may somewhat exceed the actual physical damage inflicted, by virtue of their effect on enemy organization.

Careful study of the uniformly successful July-August carrier operations, which involved largely the familiar pattern of strikes on island objectives, has revealed few if any weaknesses not previously noted.

With respect to losses to enemy AA, the situation was improved over June. The heavy battering which most of the targets received must inevitably have cut AA losses to some extent; AA was reported to be very little of a problem during the later stages of the Guam operations. The AA loss rate over Marianas targets for July-August (0.18 percent of sorties as against 1.15 percent in June) reflects this improvement of target conditions. It is also evident that positive action taken by our air groups was instrumental in holding down losses. This was particularly evident in the 3-4 July strikes at Iwo Jima, where AA losses were held to 3 planes, as against 11 planes from a nearly equal number of attack sorties on 15-16 June; the liberal use of rockets and small bombs in attacks on AA positions contributed to this result. On 4-5 August, when fewer bombs and no rockets were used against AA, AA losses rose again. Losses to AA at Palau were over 1 percent of sorties; here, though efforts were made to hit AA, smaller proportions of 100s, 250s, frags and rockets were used.

Chief continuing weakness in carrier operations appears to lie in the selection of bombs and fusing for use against various targets. It may be granted that our knowledge of the most effective bombs for some targets is not perfect, and that battle conditions sometimes prevent exact adjustment of the weapon to the target on all missions. It is also apparent that the bombs and fuses actually used are not always correctly reported; ACI officers should check their own individual performance in this regard. Even making these allowances, our knowledge of ordnance is sufficient to indicate that too many bomb loadings were poorly adapted to the job at hand. In part this resulted from shortages of some types of bombs; in part the reasons are not evident. While there is obviously no means of measuring the effect of using ineffective ordnance, its hindrance to the maximum effectiveness of carrier aircraft may sometimes be considerable. When the cost of putting a plane over the target is considered, in man-hours, ships, planes and equipment, and the risks which flying personnel must undergo, and the lives which often depend upon bombing results, every effort should be made to load the plane to produce the greatest damage of which our ordnance is capable. On occasion the importance of carrying proper ordnance may well be sufficient to warrant delaying a flight. Mere tonnage of high explosives is not enough; the type of package and the length of delay are extremely important in producing results. Detailed comments on bomb selection will be found throughout this report.

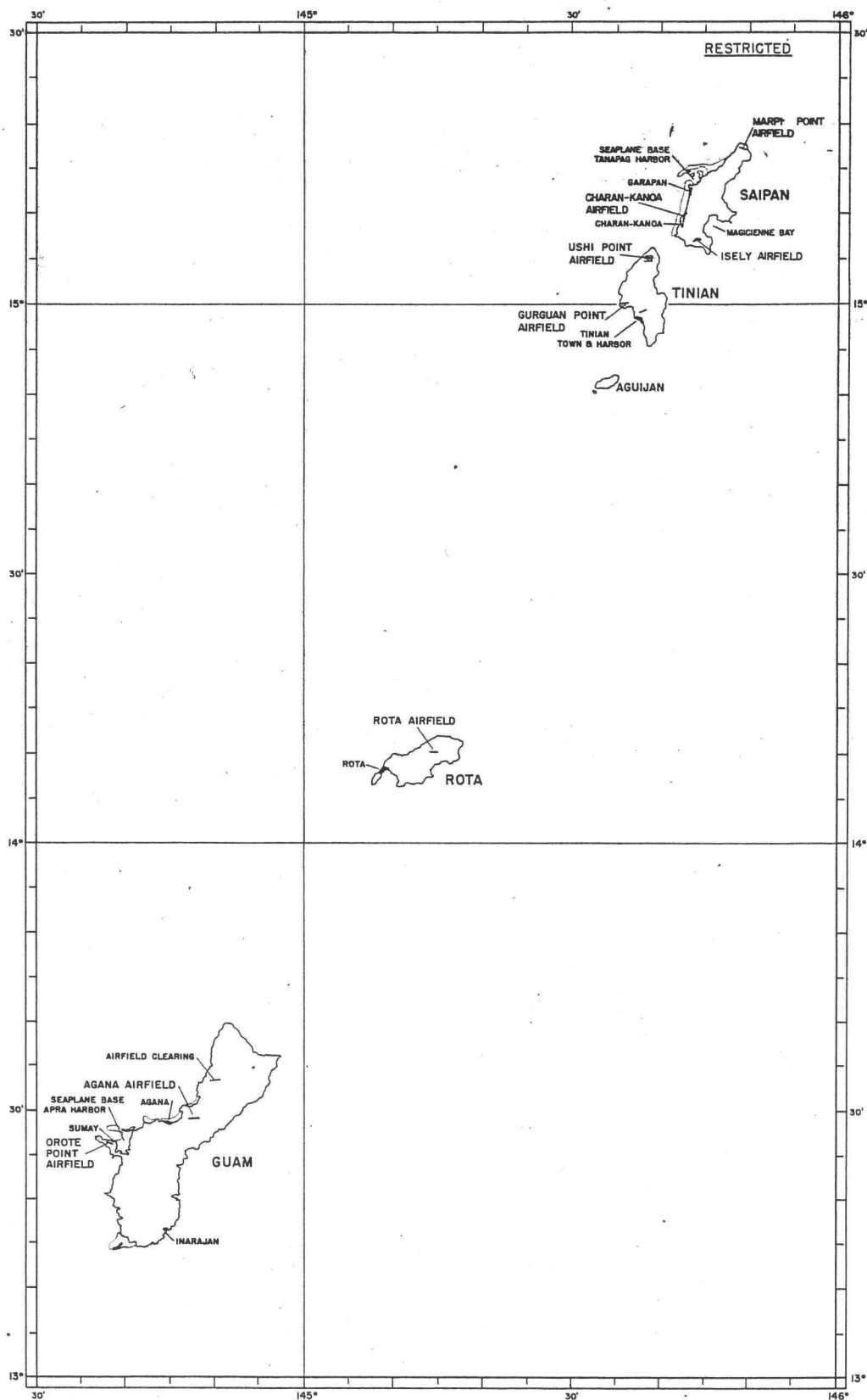
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Target selection appears to have been generally good throughout the July operations. In attacking Japanese-occupied territory over which our ground forces must pass, it is of course difficult to find a target whose destruction will not be of some benefit. General attrition is frequently of value under other circumstances, as at Palau. However, every military or commercial installation does not always have to be destroyed, if the destruction of a selected few will make others militarily useless to the enemy. This primary principle of target selection should be kept in mind by all planners and strike leaders.

Minimum altitude attack again demonstrated its capabilities in the July operations, but this time over land and not against the several shipping concentrations found. VF, VSB and VTB successfully attacked bridges and other small targets whose destruction from higher altitudes had been found impossible or unduly expensive. The desirability of extending these attack tactics to shipping as well is suggested by consideration of some of the ineffective dive and glide attacks described on later pages. It should again be emphasized that the accuracy of dive and glide attack is frequently overestimated; when certainty of hits and economy of effort are desired against targets which are hard to hit in dive and glide attacks, and which offer appropriate vertical surfaces, low level attack should be considered, AA permitting.

In the field of shipping attack, torpedoes again proved themselves during the August Bonins raid, and it may be anticipated that their use will increase in the future, as it apparently did in the September operations.

Little has been said in the Analyses regarding carrier photography. The tremendous volume of important work which photo pilots and ships' photographic personnel have accomplished in the past few months, from small beginnings, merits a "well done". There is no doubt that the success of our air and ground operations, and surface bombardment, have in large part depended upon complete, up-to-date, and high-quality photographic coverage. This has in turn resulted from placing special photo planes and trained photo pilots aboard carriers, from placing photography on an equal plane with bombing in operations plans, and from the cooperation of far-sighted carrier and air group officers in facilitating photo missions. The next step, already requested by fleet units and in progress ashore, will be the training of photo teams of 4 VF (instead of individual pilots) for assignment primarily to flag carriers as special photo-intelligence units. Still unsolved is the problem of how to cope fully with the wide demands for prints of the increasing volume of photos, in the face of restricted facilities. Securing complete on-the-spot interpretation during a strike is also an increasing problem. These difficulties appear to be recognized by the operating commands, but remedial measures will probably require some time for accomplishment.



S E C R E T

II. AMPHIBIOUS SUPPORT IN THE MARIANAS

A. GENERAL

As has been said above, the July installment of carrier operations in the Marianas was directed largely against Guam. During the first 8 days of the month, the 6 or more CVEs present flew about 400 target sorties, of which a scattered 40 were over Tinian and the rest against Saipan. But thereafter until the 18th, all CVE activity, averaging about 13 target sorties per ship per day, was directed against Guam. During the same period, also, the CVs and CVLs, flying respectively about 24 and 11 target sorties daily, devoted their attention primarily to Guam, with, however, a total of 180 sorties diverted to Rota.

From the 18th through the 21st (D-Day), great strength was concentrated against Guam, culminating in 1,399 combat sorties on the 20th. On the 23rd and 24th one CV-CVL group, and about a third of the CVE strength, were diverted to Tinian. This allocation of CVE strength continued for the rest of the month. The one remaining fast carrier group concentrated on Guam from the 25th until the last flights on 8 August, with a total of 173 sorties again diverted to Rota. The primary burden of air support at Tinian (after D-Day) was borne by Army P-47s operating from Saipan.

A total of over 10,000 target sorties were flown from carriers against the Marianas for the period 1 July to 8 August, and over 16,000 from 11 June to 8 August. Of this number, over 7,500 sorties in July, and a total of over 9,800 for the entire operation, were against Guam. In bombs, also, Guam received 2,660 out of 3,100 tons in July-August, and 3,540 out of 5,287 for all operations against Marianas land targets. A total of about 700 tons were dropped on Saipan, 530 on Tinian, and 350 on Rota, by carrier planes during the Marianas operations.

The comparatively great concentration of strength against Guam was of course in part required by its relatively larger area, and was in part due to the large expenditure of bombs for the neutralization of Guam airfields in June. Nevertheless, it seemed probable that the comparatively easier time our troops had on Guam may have been in part due to the greater weight of aerial attack.

From 14 July, when Commander Task Force 53 arrived off Guam, Commander Support Aircraft controlled air activities. During the period of preliminary softening up, targets were worked over systematically. A target list was prepared, and kept constantly up to date from all available sources. As targets were destroyed, they were checked off, but occasionally reexamined. The island was divided into two zones, with ship gunfire and aircraft alternating zones in the morning and afternoon of each day. On D-3 day the tempo of operations, was, as is indicated above, stepped up, and with the arrival of the remaining fast carrier forces, it was possible to put a full carrier deck load on station for fifteen minutes every forty-five minutes - increased to fifteen minutes every half hour on D-2 and D-1 days. Targets were those previously designated by CTF 58, modified by dispatches containing later information from TF 53 and by the assignment of new targets to flights on station. Simultaneous gun fire and bombing was used during this period, gun fire trajectories being restricted to 1200 feet above sea level, with flying prohibited below 1500 feet.

* Much of the narrative which follows is summarized from the excellent report of CTF 53.

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On D-Day, full deck loads of planes, totalling 312, from three groups of fast carriers, were on station for an hour prior to H-hour, and dropped a total of 124 tons of bombs on the beaches. As the landing boats approached the beaches, 32 VF from CVEs attacked the beaches with depth bombs and strafing until the troops were almost ashore. 12 VF then strafed inland until the troops were actually on the beaches. Immediately thereafter, 24 VF with rockets and 24 VT, each with twelve 100-pound bombs, attacked 1500 to 2500 yards inland. During the rest of the day groups of 16 VF, 12 VB and 9 VT reported every hour and a half for assignment, and deck load strikes were made on targets designated by CSA in three zones in which troops would not be endangered. A roving patrol was planned as well, whose mission was to attack immediately any gun spotted on the mountains facing the beaches. Little gun fire was found, however, and the patrol was diverted to attack designated targets. Control was effected by CSA with the aid of a plexiglass chart, on which the identity and movements of all aircraft were recorded.

This heavy concentration of planes, with an equally heavy concentration of naval gunfire, on the flanks of and immediately ahead of the approaching waves of troops, resulted in light initial opposition to the landings.

On days subsequent to D day, flights of 16 VF, 12 VB and 9 VT were scheduled to report every hour and a half. On D plus 2 day, this number was discovered to be in excess of requirements, and was decreased. Of these strikes, a small number were reserved for close support and the balance were used to knock out new targets as they were discovered.

The concentration of bombs at the beachhead areas, and the vital Orote Peninsula area between the main beaches, is revealed by the data below showing each area's percentage of the bomb tonnage dropped under the control of Commander Support Aircraft, covering roughly the period 15 July to 1 August:

North Beach area, including Agana, Piti, Cabras Island	36%
South Beach area, including Agat	25
Orote Peninsula	12
Other beachhead areas	7
Agana airfield area	5
Other areas: bridges, warehouses, supply areas, bivouacs, etc.	15
	<u>100%</u>

The enormously complicated job of directing and coordinating the innumerable air attacks during the operation was excellently handled. Assisting the Commander Support Aircraft were Air Coordinators. In addition to their duties as "traffic supervisors", they performed valuable services in discovering new targets and reporting results of attacks. They were stated to be invaluable to CSA. It seems plausible that in non-amphibious operations, a similar method of control giving an airborne observer discretion to vary targets within the target area, might be equally valuable. The following description of the method of control developed at Guam is taken from a report of CAG 13:

"In support aircraft missions the Commander of Support Aircraft, located on a command ship, has control of all aircraft over the target area. These aircraft are of two general classifications: (1) the support attack group; and (2) Air Observers, Spotters and Air Coordinators. The Air Coordinator is directly

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under the Commander of Support Aircraft and takes station over the target area where he is readily available to the Commander of Support Aircraft for such information as he may require.

"The chief function of the Commander of Support Aircraft is to assign targets to support attack groups. He selects the target in one of two ways; (1) from enemy positions known to exist from intelligence acquired previous to the landing operations; and (2) from information given him by the Air Coordinator, the Air Observer, or attacking units.

"After an attack group is airborne from its base carrier, it proceeds to and orbits an established Rally Point where the flight leader reports to the Commander of Support Aircraft. The Commander of Support Aircraft assigns the attack groups a target, using a grid map reference.

"One of the most important problems in support missions is the clear, quick and efficient transmission of target assignments from the Commander of Support Aircraft to flight leaders of attacking groups. This must be done in such a manner that the flight leader, in the few moments at his disposal before the order to attack is given can definitely locate and recognize the target before executing the attack. The location and recognition of targets assigned by grid map reference is a difficult task. Flight leaders and individual pilots are deprived of the advantages of briefing on the target prior to the attack, yet they are called upon to execute the highest degree of accuracy in bombing, and strafing. Often the assigned targets are five hundred yards or less from our own troops.

"It is believed that the Air Coordinator is in a position to contribute much to the solution of this troublesome problem. In the case of this air group, the Air Coordinator was the Air Group Commander or a Squadron Commander and it is believed this is the general practice followed by other groups called upon to furnish an Air Coordinator. By virtue of being airborne over the target for periods of long duration, of having engaged in previous strikes, and of knowledge derived from intense study necessary for the successful accomplishment of the mission assigned, the Air Coordinator is more familiar with the individual targets and the area than are the leaders of the various flights reporting on station for call missions. The Air Coordinator is qualified to assist the flight leader in locating and pin pointing the target assigned him by the Commander of Support Aircraft."

In addition to the Commander Support Aircraft and the Air Coordinators, valuable contributions to the cause of coordination can be made by experienced and conscientious Air Group Commanders. The following paragraph summarized the practice developed by the Commander of Air Group One:

"The pilots of Air Group One learned a lot during the present operations, especially from repeated strikes on targets. The confusion of early strikes was replaced by a fairly good knowledge of what each pilot did. For all the first strikes, the Air Group Commander led the attack with a four-plane fighter division, bombing or strafing, but was unable to do much observing. In an attempt to rectify this, he made his dive with the dive-bombers or torpedo planes but this was still not satisfactory. When he remained overhead, the planes were lost as soon as they started down in their dives. A very satisfactory solution was

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finally found. A K-18 camera was installed in his plane. His division then dived on the target about two minutes prior to the main attack. He was then able to relay information on the condition of the target, A.A., altitude of base of clouds, etc. He then took up position at an altitude of one to two thousand feet as close as he could get to the target. From this position he could get pictures of the attack and watch the dives. It was possible even to get the number of a plane that made a hit. Vertical photographs plus pictures taken from the rear seat of dive-bombers and torpedo planes aided analysis of results. Meetings were held after each strike and every pilot was urged to criticize his own and others' efforts.

"As the result of careful observation and analysis of efforts, pilots reached the point where they were the first to tell if they missed the target by 500 yards or if they pulled out a couple of thousand feet higher than the average. A spirit of healthy competition started that almost made them forget that Japs were shooting at them while they were working."

Close support missions required particularly precise cooperation on the part of all concerned. Requests were made to Commander Support Aircraft, who analyzed them to be certain they could be carried out without danger to troops. The Air Coordinator and pilots were then carefully instructed on the nature and location of the target, and the direction and method of attack. It was found essential that first a dummy run be made by the Air Coordinator, and a report on accuracy requested from the Air Liaison Party, and second a live run with a small bomb or burst of gunfire, to assure the correct location of the target and to pinpoint it for the other pilots, again with a report from the Air Liaison Party. If this run was found to be satisfactory, the Air Coordinator led the planes in, one by one, to attack the target. This process was by its nature found to be time consuming, and therefore close support missions were not assigned to planes which had less than an hour remaining of scheduled time on station. Ex-ASP planes, theoretically available to the CSA, were frequently sent back to their ships immediately upon reporting because they had insufficient time left to make a well-executed attack.

In spite of these efforts of the CSA, it was reported in ACA reports that a number of flights spent up to an hour and more on station before being assigned to targets, often leaving them without time properly to spot the target before they were forced to return to base. In some cases, it was commented that targets assigned only after notice was given that the planes were about to depart, and that the targets at times seemed to have little military value, and to be poorly identified. This fact, plus the relatively small number of flights per carrier flown during most of the month, leads to the conclusion that perhaps more carriers were present, and more flights flown than proved necessary. It might be possible in future operations to rely to a somewhat larger extent on the launching of planes when called for, rather than having them stand by in the air. With the increasing distances between bases and operating areas, every effort will be required to prevent needless attrition of planes and exhaustion of pilots. •

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ACA reports commented, also, that on occasion an air group had been concentrating on a particular target area for a number of days and had become familiar with it, only to find its target exchanged for that of another group which had been similarly concentrating, to the obvious loss of efficiency of both groups. Similarly, bomb loadings available in the air were perhaps not always perfectly matched with the targets that presented themselves, although it appears from a statement quoted below that the requested bomb loadings were not always furnished.

The paragraphs which follow are an attempt to investigate the possibilities of increasing the destruction which might be inflicted on the enemy, and the economy which might be practised in the employment of our own forces, by greater attention to the comparative military value of possible targets and to the selection of the most effective bombs, fuses and tactics to be used against them.

B. SELECTION OF TARGETS, BOMBS, AND FUSING, AT GUAM

The early complete conquest of the enemy air force in the Marianas greatly changed the aspect of ground support during the course of the operation. As has been pointed out, 43% of the total bomb tonnage dropped in June was devoted to airfields, and 23% to AA guns, or a total of 66% to targets which would not directly benefit ground troops. In July, however, on Guam, only 1½% was expended on airfields, and only slightly over 11% on AA positions. Moreover, it is probable that most of the tonnage dropped on airfields was directed against installations of value to enemy ground forces, rather than against the fields as possible landing grounds. Over 85% of the tonnage was available for direct support. About 70% was divided in roughly equal portions between guns, buildings, and beaches and personnel. Almost all of nearly 1,500 strafing sorties and the rockets fired were divided between these targets, with about half of the rockets directed against troop concentrations, beach defenses, etc. The following table shows the approximate bomb distribution:

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TYPE OF TARGET (Guam, 5 July- 8 August)	Percent of Total Bomb Tonnage	Number of Rockets Fired	Number of VF Stra- fing Sorties*	Percentages of Bombs Used (By Weight)						TOTAL
				100 GP	500 GP	1000	SAP	Inc.		
				250 GP	350 DB	2000	AP	GP		
Guns, All Types	32%	436	531	16%	39%	26%	19%	-	100%	
Personnel, beaches etc.	24	1001	324	30	52	15	2	1%	100	
Buildings	23½%	445	420	12	45	19	15	9	100	
Pillboxes	2	31	13	14	6	34	46	-	100	
Ammo and Supply	4	54	23	25	44	24	7	-	100	
Dumps										
Bridges	4	16	-	13	13	43	31	-	100	
Airfields	1½%	-	8	2	29	33	36	-	100	
Miscellaneous	9	89	157	10	56	25	5	4	100	
All Targets	100%	2062	1476	18%	43%	22%	14%	3%	100%	

* Excluding VF which may have strafed in addition to bombing.

The largest percentage of bombs dropped against personnel was of small bombs and frags., the largest against buildings was of medium sized GP bombs, and the largest against pill-boxes was of SAP and AP bombs. In no case, however, were these percentages as great as they might have been. Conversely, the percentages of "second-best" bombs against various targets were large.

The proper combination of bombs and targets still leaves something to be achieved. The following is quoted from the report of ComGenThird PhibCorps:

"From tests and previous experience in operations against the Japanese, the size of bomb and fuze to be used in close support of troops has been more or less clearly demonstrated. In preparing the Air Support Plan for this operation, bomb and fuze loading for certain types of aircraft to be used in close support of troops was specifically provided for, taking the above into consideration. However, seldom after W-Day did the aircraft reporting for strikes carry the bomb and fuze prescribed in the Air Support Plan or that requested - usually 12 to 24 hours in advance - by Commander Support Aircraft. It is realized that certain contingencies in this operation may have prevented the supporting carriers from providing the bomb and fuze loadings requested, but it precluded the use of aircraft on several close supporting missions."

The largest single factor entering into this result is presumably the continued discrepancy between bomb allowances and requirements, discussed elsewhere in this report. The last minute assignment or diversion of planes to targets requiring immediate attention necessarily contributes something. Something also is perhaps due to the belief that a bomb is a bomb and that the purpose of an attack is accomplished if a flight is completed and a bomb is dropped on the target, without regard to the greater damage inflicted on the enemy, and the

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greater economy of our own forces, which could be effected by proper bomb selection.

The lack of optimum efficiency apparent with respect to bomb selection is more marked when fuzing is considered. The following table shows the approximate distribution of different delays against various targets:

TYPE OF TARGET (Guam, 6 July-8 August)	Percent of Bomb Tonnage with Various Fusings*					TOTAL
	Inst.					
	Non-Delay	.01 sec.	.025 sec.	.1 or .08 sec.	4-11 sec.	
Guns, All Types	68%	14%	11%	3%	4%	100%
Personnel, beaches, etc.	68	20	2	2	8	100
Buildings	78	8	5	2	7	100
Pillboxes	78	2	18	-	2	100
Ammo & Supply Dumps	76	7	3	-	14	100
Bridges	40	23	11	7	19	100
Airfields	64	24	12	-	-	100
Miscellaneous	69	12	10	4	5	100
All Targets	70%	14%	7%	3%	6%	100%

* Incendiaries and frags excluded.

The overwhelming preference for instantaneous or non-delay fusing against all types of targets, indicated by the above table, may to some extent represent inaccurate reporting by ACI officers. Some indication of this is found in the succeeding table, where it will be noted that 35% of the AP bombs dropped were reported fused instantaneous or non-delay, although AP bombs can be fused for .08 second delay only. It should be noted by all ACI officers that 'instantaneous' and 'non-delay' refer to specific fuse settings and are not generic terms embracing all fractional second delays, and that the difference in penetration and resultant damage between instantaneous, .01, .025 and .1 is of considerable magnitude. It is not believed, however, that the table reflects only errors in reporting.

The heavy use of instantaneous fusing against some targets represents a considerable diminution of the effectiveness of the bomb tonnage dropped. Against some types of buildings, and against airfield runways, a large part of the effect of a bomb explosion is dissipated into the air if an instantaneous fuse is used, though against light frame buildings instantaneous fuses may be effective by virtue of their blast effect and fragmentation value. Against strongly reinforced pillboxes and concrete buildings, little or no penetration may be secured with instantaneous fuses.

The use of 4-11 second fuses against suspected ammunition dumps is noteworthy, as an attempt to prevent loss of planes in the resulting explosion of the dump. The wide selection of fusing for use against bridges is also noteworthy, as showing an appreciation of the demolition problems involved.

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In the following table are shown the fusings used for each type of bomb at Guam:

FUSING DELAY USED	Approximate Percentages of Fusing Delays Used, by Type of Bomb									
	DB	GP					SAP		AP	ALL H.E. BOMBS
		100	250	500	1000	2000	500	1000	1000	
Inst., Non-Delay	98%	71%	68%	68%	59%	69%	85%	73%	35%	70%
.01 Sec.	2	8	20	20	18	4	-	9	-	14
.025 Sec.	-	1	10	6	12	12	15	12	-	7
.08 or .1 Sec.	-	1	2	2	1	-	-	5	65	3
4-11 Sec.	-	19	-	4	10	15	-	1	-	6
TOTALS	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

The use of instantaneous and non-delay fusing is seen to be spread more widely among bomb types, with the single exception of APs, than among targets. As was previously pointed out, all AP bombs must have been fused for .08 second delay and none instantaneous as reported; to what extent the reporting errors for this type extend to other types is not known. Even assuming some reporting error, the high percentages of instantaneous or non-delay fusing for SAPs suggest that these bombs must frequently have been used as substitutes for GPs, since none of the penetration for which SAPs were designed is achieved with these fusings. As a substitute the SAP is inferior, having only 60% of the blast effect of a GP of the same size, and only slightly if any greater fragmentation effect.

C. TACTICAL TRENDS

No attempt has been made at a statistical analysis of the tactical aspects of the operation. However, traces of three tactical trends seem to be discernable. These are (1) a tendency toward something approaching "area bombing" tactics; (2) an increased use of fighter bombers; and (3) the development of minimum altitude bombing against land targets.

ACA reports not infrequently state that such-and-such an area has been attacked, and that the "area was saturated". It is impossible to determine to what extent these reports actually reflect attempts at "saturation" bombing, and to what extent they merely represent inaccurate reporting. "Area" or "saturation" bombing can be effective, if a sufficient number of bombs are dropped, and if the formations and release intervals are carefully planned for correct distribution. However, there is little evidence in the reports of such planning, and there is a good deal of evidence of a lack of realization of the astronomical number of bombs such tactics require, this evidence being found in a comparison of the number of bombs dropped on, with the size of, areas claimed to be saturated. The comparatively small bomb loads of carrier-type planes, and the limitations imposed by the magazine capacity of the carriers themselves, seem to preclude the expenditure of a sufficient number of bombs for the effective employment of this method of attack, against most non-industrial targets. In one respect, this recent emphasis on areas is a healthy symptom, for it denotes a growing realization that the bombing accuracy often claimed for dive- and glide-bombing is frequently a physical impossibility. The solution of bombing inaccuracy,

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however, does not seem to be to stop aiming. The best answer, for carrier planes, appears to be a combination of the most accurate method of bombing with the use of a sufficient number of aimed bombs to give a reasonable probability of securing hits, regarded in the light of a realistic appraisal of the bombing accuracy that can be achieved in combat conditions.

A good deal has been said and written recently in favor of fighter-bombers, sometimes without including an indication of the 50 to 75% sacrifice in bomb load and the even greater decrease in number of bombs carried and versatility of bomb load, or the generally greater inaccuracy of this plane in comparison with planes specifically designed for bombing. The following statement was made by ComGenThirdPhibCorps.

"It was clearly demonstrated in this operation that VF aircraft should not be used except for strafing in close support of ground troops, as their bombing accuracy is very poor".

The fighter bomber does, however, seem able to fill one need: it can, because of the protection afforded by its superior speed, be employed in minimum altitude attacks when anti-aircraft fire is not prohibitively intense but is still sufficient to keep other types at respectful altitudes. It is unfortunately not known from what altitude the attacks referred to in the quotation above were made. More information is needed to determine whether the fighter-bomber is too inaccurate even at minimum altitudes for close support.

The increased use of minimum altitude bombing seems to be the most significant tactical development in the Marianas operation. It was made possible because, since the operation extended over a considerable period, a large part of the initially heavy anti-aircraft opposition was eliminated comparatively early. The heavy expenditure of effort against anti-aircraft emplacements in June paid dividends, in permitting bombing of a type which almost guarantees reasonable accuracy. An equal, or even greater, concentration of small bombs and rockets against AA positions in the early stages of future pre-assault operations should permit fuller development of this promising beginning. If its possibilities are realized to their fullest extent, the apparently great expenditure on a secondary target should be more than repaid.

D. ATTACKS ON BRIDGES

The attacks made on bridges at Guam illustrate a good deal of what has been said above. The bridges at Guam were not so important in themselves, but they presented a type of small target whose destruction required rather exact placement of bombs, and where blast and fragmentation were of little value. As such they apparently offered something new in the way of targets to the carrier air force, and a certain amount of experimentation was indulged in. A number of bridges were bombed, but the one most frequently attacked offers a particularly illuminating study. The battle of Talafofo Bay Bridge began on 12 July with an attack from 3,500 feet by VT loaded with 1,000 pound SAP bombs. The attacking squadron's report contains the following comments:

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"1. The targets were not a good target for a glide bombing attack. They were small and therefore subject only to pin-point bombing.

"2. The bomb load carried was not one which would have been most effective against this type of target. It is felt that for a glide bombing attack against this type of target a load of 4 x 500# GP bombs should be carried. This would offer greater possibilities of hits on the target with fully as much destruction."

Then followed a number of other attacks, with various bomb loadings, from above 1,500 feet. Minimum altitude attacks were finally resorted to, being instituted by two VF who went down to 75 feet with 500-pound GP bombs equipped with 4-5 second delay fuses. The one which got a hit, however, apparently aimed at the center of the bridge, rather than at its supports, with the result that his bomb went through the planking. Other minimum altitude attacks with similar bomb loadings, or with 100-pound bombs similarly fused, finally destroyed the bridge, and the last plane attacking described its target as "remnants" of the bridge. The destroying squadron commented as follows:

"As the bombs had 4 to 6 second delay fuses, and as there was no anti-aircraft fire, it was possible to make an extremely low-level attack which was so effective that the bridge was completely demolished after 9 planes had released bombs on it. As a result the last section attacked a command post . . . The delay fuses cannot be too highly recommended in situations where no anti-aircraft fire is encountered. They make possible an extremely low-level attack, permitting the pilot to see his target at close range and to drop on it from a minimum distance. A highly important secondary advantage is that the time interval is sufficient to permit the pilot to observe the result of his attack, thereby contributing greatly to an accurate assessment of damage. It is considered that the mission of this flight was accomplished with outstanding success."

The following table is a summary of the attacks on the Talafofo bridge:

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DATE, TIME	PLANES	BOMBS, FUSING	ALTITUDE	CLAIMED HITS	CLAIMED RESULTS
12 1610	4 VT	4x1000 SAP .025	3,500	1	"serious damage"
1630	8 VF	8x500 GP .1	?	1	" "
20 0945	8 VF	7x1000 SAP ND	2,500- 3,500	0	
"	10 VB	10x1000 GP Inst. 20x100 GP Inst	1,000- 1,500	0 0	
"	8 VT	21x500 SAP ND	2,000- 3,500	0	
1020- 1050	6 VT	54x100 GP Inst.	1,500-	2	unobserved
1140	7 VB	7x1000 GP Inst. 12x100 GP Inst.	1,500 2,000	0 0	"damaged by 3 near misses"
1430- 1500	8 VB	8x1000 GP .01 16x100 GP .01	2,000)	4	"destroyed"
1520- 1535	2 VF	2x500 GP 4 sec.	25-75	1	hit thru planking
1645- 1710	4 VF	4x500 GP 4 sec.	500	2	"destroyed"
21 0915- 1000	9 VB	16x500 GP 4 sec. 17x100 GP 4 sec.	100- 200	5	"destroyed"
1105	1 VT	4x500 GP .01	2,000- 2,500	0	
1200	1 VB	1x1000 GP 4 sec. 2x100 GP 4 sec.	700	?	target described as "remnants"

TOTALS: 1,000 feet and above: 60 planes, 171 bombs, 8 hits, claimed.
25 to 500 feet: 15 planes, 39 bombs, 8 hits claimed.

It may be noted that the only squadron attacking from above 500 feet which claimed destruction of the bridge was followed immediately by another pilot who put a bomb through the "destroyed" planking and who, observing from 75 feet, did not report that the bridge had even been damaged.

The whole episode elicited the following comment from CTG 58.1:

"Three successive groups of bombing planes were used against a bridge in the TALAFORO River area with negative results. Then, after a suggestion made by this Task Group to the Support Aircraft Commander, twelve VF were loaded for minimum altitude bombing with delayed action bombs and scored three destructive hits. During the first TRUK strike a single torpedo pilot making masthead runs and using four five-hundred pound delayed action bombs destroyed two medium AKs. These examples demonstrate the possibilities of minimum altitude bombing by carrier-based planes, and such tactics are strongly recommended for incorporation

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in the operational training syllabus. For good results, minimum altitude bombing does not require as much practice as either dive bombing or glide bombing and may be preferable in some cases."

E. ATTACKS ON OTHER ISLANDS

No attempt has been made to analyze the CVE attacks against Saipan which extended into July, as it was felt that the operation against Saipan was sufficiently covered by the analysis of the main effort during June. Similarly, no analysis has been made of the attacks on Tinian, since, as has been said, much of the burden of support there was borne by Army planes, for which detailed reports are not available. It may be noted, however, that the railroad on Tinian came in for 7 strafing sorties and 39 bombing sorties, dropping 22½ tons of bombs. This amounted to over 10% of the total tonnage dropped by carrier planes on the island. If the little railroad possessed anything of tactical value to the Japanese, it seems probable that it could have been denied more effectively and economically by searching out and strafing the locomotives, which must have been few, small, and easily found, than by bombing miscellaneous rolling stock and the roadbed - the latter a target which is as hard to knock out permanently as an airfield runway, and harder to hit.

An analysis has been made of the miniature war waged against Rota, in an effort to determine the reason for and the effect of this considerable diversion of strength from primary targets, a diversion which for the whole operation amounted in tonnage to nearly one-half of the effort expended against Saipan. In June much of the effort was expended against the airfield; for July 6-28 the following is a tabular summary:

TARGETS AT ROTA	TONS OF BOMBS DROPPED							NO. OF ROCKETS FIRED
	TOTAL	% of Total	100 GP	500 GP	1000 GP	SAP	Inc.	
			250 GP	350 DB	2000 GP	AP		
			Frag.					
Buildings & Towns	84	50	13	31	12½	19	8½	96
Sugar Mill	9½	6	1½	2½	2½	3	-	11
Railroad	11½	7	1	-	10	-	½	26
Airfield	58	35	5	26	18	9	-	-
Misc.	3½	2	½	2	½	½	-	4
TOTAL	166½	100	21	61½	43½	31½	9	137

So far as is known, no landings on Rota were ever contemplated, and little reason is apparent for attacking it except to deny the use of its airfield to the enemy. Yet less than 36% of the total bomb load was devoted to the airfield, anti-aircraft guns and the undoubtedly inoperational aircraft combined. Some of the buildings attacked were associated with the airfield, but damaging them would not constitute the most effective means of keeping the field out of commission. The necessity for the attacks on the town, the sugar mill, and above all the railroad, is somewhat difficult to discern. These may be appropriate targets for land-based bombers in a campaign of attrition prior to eventual landings (especially when few other

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targets are available to them, as during August, September and October), but targets of this type are not the most efficient use of carrier aircraft when targets are available on islands where more immediate landings are contemplated.

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III. STRIKE ON PALAU AND YAP

A. PALAU, 25-27 July

The primary objective of the operation by TG 58.2 and TG 58.3 against Palau on 25-27 July 1944 was to obtain complete photo coverage of the islands, with the secondary purpose of eliminating enemy shipping and aircraft and smashing vital buildings and installations.

TG 58.2 (FRANKLIN and WASP) had as its objective the central part of the chain: Koror, with the adjacent Arakabesan and Malakal, and the southern part of Babelthuap. TG 58.3 (BUNKER HILL, LEXINGTON and SAN JACINTO) had as its main objective Peleliu, with adjacent Ngesebus and Angaur to north and south respectively, and with some strikes, especially against shipping, ranging north as far as southern Babelthuap.

The table gives the effort expended against each of the seven islands attacked, and against shipping, in terms of bombs and ammunition, by weight and type. A total of 2233 bombs, weighing 467 tons, were dropped; 378 5" HE rockets and over 350,000 rounds of aircraft ammunition were expended.

TARGET	GP		SAP		DB	100#	100#	Total Tons	RP	Strafing Rounds
	100	500	1000	500		Frag	Incend.			
	250		2000	1000	350	Cluster	Cluster			
Koror	187	535	72	7	33	76	223	216	224	92,000
Malakal	58	46	32	6	9	2	114	50	48	20,000
Arakabesan	19	28	21		8		18	21		16,000
Babelthuap	17	12	10	2	7			11	100	30,000
Peleliu	26	101	28	24	26	48	40	70		57,000
Ngesebus		26	11	1	12			15		50,000
Angaur	8	50	12				4	19		32,000
Shipping	77	61	68	46	13			72	6	60,000

The extent of concentration on the small island of Koror should be noted. This is the administrative headquarters of Palau and the principal town; an attempt was obviously made to wreck the town by putting 50 per cent of the bombing effort on this one island. A large area near the radio station was leveled, and the station and numerous barracks were damaged. Fires were started in the built-up part of the town by incendiaries dropped in the last strike.

The relatively small volume of attack on Peleliu, Ngesebus and Angaur, all scheduled for assault in September, should also be noted. The minor effort against these probably reflects an intent to conceal from the enemy our particular interest in them, the dearth of immediately profitable targets thereon, plus the fact that effective bombing preparation for amphibious assault cannot be made far in advance.

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Fighter sweeps totaling 79 sorties were conducted by VF from all five carriers against both the central and southern groups of islands at approximately 1500 K on 25 July (Y-1). Air opposition was negligible. Of 12 enemy planes airborne, five or possibly six were destroyed in the air by the 8 of our VF which were able to engage. Airfields and AA positions were worked over, with at least 10 enemy planes destroyed and 18 damaged on the ground, according to ACA-1 reports. (Photo interpretation reports indicate 39 enemy aircraft destroyed on the ground at all Palau fields during the entire operation). Our losses were two VF to AA and one to own bomb hit. Two pilots were rescued. Four VF suffered minor damage by AA. There were no operational losses. Air opposition was wholly absent after 25 July.

Four strikes were made by all squadrons on each of 26 July (Y-day) and 27 July (Y + 1). On each day these strikes were made at approximately 0730-0800, 0930-1000, 1200-1230, and 1430-1500K. Photo missions, begun by 8 VF on 25 July, were continued on succeeding days, with a total of 34 additional sorties by VF, 6 by VB, and 2 by VT. These missions, skillfully and often daringly executed, produced almost complete photo coverage of the main islands of the central and southern groups.

Airfields and planes in revetments and in dispersal areas on Babelthuap, Peleliu and Ngesebus and the seaplane bases on Malakal and Arakabesan were hit sporadically on 26 and 27 July, but with almost wholly unobserved results, partly because of smoke and dust, and thick vegetation in the dispersal areas. However, in the light of the scale of effort against other objectives, perhaps insufficient attention was paid to being sure of knocking out permanently planes in revetments and dispersal areas. Excluding the 21 planes claimed destroyed at Peleliu, there were 44 others which in photographs appeared undamaged. These were dispersed, and had been repeatedly strafed, and at least 50% were believed to have been left inoperational. Rocket VF (not used at Peleliu) might have accomplished more destruction.

A strong effort was made against AA positions in the central islands, especially Koror, and a lesser effort in the southern islands. AA was at all times intense and often accurate. Permanent damage is hard to estimate. Volume of fire diminished during attacks, but was usually resumed by the next strike.

Losses to AA on 26 and 27 July were 2 VF (pilots rescued), 5 VB (all pilots and crewmen rescued), and 3 VT (one pilot and crew rescued). Damaged by AA (according to ACA reports) were 11 VF, 6 VB, and 13 VT. Operational losses were 3 VF, 3 VB (including one lost to a bomb jettisoned by a plane of the same squadron), and 1 VT. All pilots and crewmen were rescued. Operational damage was incurred by 2 VF, 1 VB, and 2 VT.

A major part of the effort was directed against installations on the islands. The following precision targets are reported:

Babelthuap: Radio station - 75% destroyed
Bauxite plant - slightly damaged

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Koror: Water plant - seriously damaged
Ammo dump - exploded

Malakal: 3 oil storage tanks - fired

Arakabesan: Fuel dump and ammo dump - exploded

Peleliu: Radio station, RDF, and control tower-seriously damaged

Angaur: Phosphate workings - largely destroyed

However, most of the strikes hit more or less at random at storehouses, barracks, and other miscellaneous buildings. To quote the CO of VT-14, these attacks were "not intended as precision strikes on pin-point targets but as area bombing whose purpose was to destroy the town (Koror) and create a diversion from the photographic runs. Inasmuch as the bombs on the ship (WASP) consisted of a limited supply which had been loaded at Saipan two nights before, the bomb loads for the strikes were based on the number and type available rather than the needs of the mission".

About 20 tons of magnesium incendiary clusters were dropped. VT-14 also repeats a criticism which has been made before: "This is the fifth time that VT-14 has dropped incendiary bombs on enemy buildings and installations without noticeable results. The pilots are not enthusiastic about dropping these clusters because they do not believe that they are worth the effort and risk to drop them on the target. It is felt by this squadron that incendiaries are a worth-while bomb load only when carried in sufficient numbers to insure a large number of incendiaries actually landing on combustible objectives. Even in heavily built-up areas, a surprisingly large number of incendiaries will hit the ground and cause no damage at all. In the areas in which this squadron is operating, building dispersal is more widely practised than in European and Asiatic towns and cities. Therefore a 6 or 8 plane incendiary attack is going to put relatively few bombs on places where they can burn, and those fires which are started are not numerous enough to overwhelm the enemy's fire-fighting facilities. Therefore it is recommended by this squadron that incendiary attacks which are made in the future be made only against suitable targets which have previously been hit with high explosive bombs and be made in such numbers that complete saturation of the building area will be assured."

In connection with the above comment, it should be noted that 6 TBFs, with full loads of AN-M6 clusters, will drop a total of 2448 individual 4 lb. incendiary bombs. This number should be sufficient to saturate a small area, if dropped in concentration. The difficulty may be, as suggested, that buildings in the areas attacked were too widely dispersed. It may be that the AN-M12 oil incendiary cluster, whose bombs eject incendiary material up to a maximum of 75 yards, may be more useful against such targets.

A note may be made of the extensive effort, largely successful, of TG 58.3 to knock out the phosphate workings, storage, and loading facilities on Angaur. No other single objective was so thoroughly plastered. It is difficult to see why, when occupation was contemplated within a matter of weeks, so much effort was expended against this target.

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Against shipping targets on 25-27 July inclusive, 265 bombs with a weight of 73 tons were dropped, and six 5" HE rockets and 60,000 rounds of ammunition were expended. Although nearly all the shipping targets struck were at the central islands, all the bombs dropped were by TG 58.3, which had the southern islands as its land objectives. Planes of TG 58.2, although given shipping as priority targets, limited themselves, except for two rocket sorties, to strafing. A variety of reasons were offered: ships were not in area assigned or had already been attacked, bombs had already been expended, VB and VT left ships for strafing by VF, etc.

On 25 July, a Fubuki class DD and a 150 foot trawler were sunk by VF strafing. On the succeeding days one DE, a 90-foot new-type sub-chaser, and a 4000 ton AK were sunk, a large armed LCI was gutted and beached on its side, a small AO was beached and exploded, and four or five medium or small AK's were damaged. Various smaller craft were also attacked.

Some question may be raised concerning the effectiveness of the attacks on the LCI and DE. A disproportionate effort seems to have been expended on these vessels, while other shipping was attacked lightly or not at all. The LCI was the aiming point for twenty 1000-lb. GP, 43 500-lb. SAP, and GP, 33 100-lb. GP bombs and six 350-lb. depth bombs (total bombs: 102), plus strafing; the DE was attacked with four 2000-lb GP, four 1000-lb. GP, one 1000-lb. SAP, eight 500-lb. GP, 6 500-lb. SAP, and eight 100-lb. GP bombs and six 350-lb. depth bombs (total: 37).

The FRANKLIN'S VF squadron, the first to be equipped with rockets, carried out attacks on parked aircraft and on AA positions, as had been the case at Iwo Jima and Guam. One enemy VF was definitely destroyed and 3 were damaged by rockets. Damage to AA could not be observed, but volume of fire diminished in many cases. However, 3 VB from FRANKLIN and 2 VF from WASP were lost to AA; and 4 VF, 2 VB, and 7 VT from the two carriers were damaged. Serious damage to the water plant on Koror resulted from 12 hits out of 48 rockets fired.

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B. YAP AND OTHER ISLANDS, 25-28 JULY

The following table presents a breakdown of the strikes on Yap and neighboring islands by TG 58.1:

TARGET	TOTAL	COMBAT SORTIES				TONS OF BOMBS	ROUNDS FIRED STRAFING
		VF Bomb	VF Strafe	VSB	VTB		
YAP: Town Area	418	31	109	151	127	190	148,000
Airfield	59	15	37	6	1	7	68,000
AA positions	159	9	107	32	11	28	120,000
SHIPPING	23	-	17	2	4	4	19,000
ULITHI, SOROL, NGULU, FAIS	47	11	26	3	7	4	26,000
TOTALS	706	66	296	194	150	233	381,000

These strikes, which coincided with those of the other two groups at Palau, and continued an additional day to cover their retirement, also had full photographic coverage of the islands as a major objective, along with the objective of thoroughly plastering installations in the islands.

1. Yap Town Area

A study of the table showing the extent of the attack effort reveals that a major part was directed at the town and built-up areas, 418 out of 706 sorties and 190 out of 233 tons of bombs. The results of this pounding were evaluated as follows:

Destroyed - 4 large native warehouses
2 buildings
5 fuel dumps
RDF and weather station
Radio station (partially)

Damaged - Power plant
Causeway and 3 piers
Lighthouse
Buildings

The bombs dropped on the town area were as follows:

100 lb. GP	47	500 lb. SAP	16
500 lb. GP	236	1000 lb. SAP	14
1000 lb. GP	68	Frag clusters	34

Most bombs were fused non-delay against the light construction with a few .01, .025 and 4-5 second delay. The power plant was evidently a first priority target as a great deal of effort was directed at it. While pilot reports claim hits the target was adjudged only damaged.

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A review of the strikes leaves the impression that on the whole the selection of targets was left pretty much to the individual strike leaders and pilots. The result was that in general many bombs were dropped on built-up areas without regard for the knocking out of specific targets. The neutralization of a target does not necessarily involve the leveling of every structure in the area but the specific destruction of designated targets of military significance, in some order of priority.

The air strike effort at Yap (secondary in importance to the photo reconnaissance) does not seem to have been particularly effective. However, there do not appear to have been many targets at Yap worth the attention of a major carrier force over a 4-day period.

2. Anti-Aircraft Targets

Next to the built-up town areas, anti-aircraft installations were the most heavily hit targets. Opposing fire was troublesome most of the time but was seldom intense or accurate. Two planes were lost. One TBF taking pictures of the airfield at 1600 feet was hit by a probable 3 inch shell which flamed the aircraft. All three members of the crew parachuted into the water about a mile offshore. Rescue was promptly effected by two Kingfishers in spite of heavy shore batteries which fired on the men parachuting and on the floatplanes making the rescue. A Helldiver was hit in a strafing run following a bombing attack on the dual purpose AA battery near the power plant. The crew parachuted and the pilot was rescued by an OS2U. The crewman's chute was not seen to open. Another SB2C was lost from presumed mechanical failure of controls when it failed to recover from a dive; there was no AA fire in this case. Six planes were hit and damaged to minor degrees by AA fire.

The 28 tons dropped on AA positions consisted primarily of 24 500-pound GP bombs, 13 1000-pound SAP and 27 1000-pound GP bombs. The fuses seemed fairly evenly divided between non delay and .01 second, with a few .025 and 4-5 second delay. This tonnage was accompanied by 120,000 rounds of strafing which drove crews to shelter and materially lessened the intensity of fire during strikes.

Pilot reports claim ten hits on AA emplacements and the Task Group report claims only that ten positions were bombed and strafed. With 52 bomber sorties (including 9 fighter bombers) dropping only 64 diversely fused bombs it is not likely that much damage was inflicted on AA positions.

3. Airfield Attacks

Airborne opposition was never a problem in the Yap area during this strike. At noon on the 25th just before the fighter sweep was launched 3 Kates were detected. One of these was shot down, exploding in mid-air, and the other two escaped in the confusion of investigating a bogey which turned out to be a SoWesPac B-24. No further airborne enemy aircraft were seen, and no particular amount of effort was expended cratering runways or neutralizing the one operational field in the area.

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The runway was cratered by 9 hits, four of which were 1000-pound GP bombs intended for AA positions alongside the strip. Two fuel dumps and two buildings at the field were destroyed. Twenty aircraft on the field were strafed repeatedly and results are reported as 1 Betty and 9 single engine planes destroyed and 10 single engine aircraft damaged (reduced by CTF 58 to a total of 6 destroyed and 5 damaged).

4. Shipping

The only shipping discovered in the Yap area was a 2500 ton-AK well covered with foliage, anchored in a cove north of Yap town. This ship was first attacked by two dive-bombing Helldivers which missed with two 1000-pound GP bombs. A couple of hours later three TBFs armed with 12 500-pound GP bombs fused for 4-5 second delay for low level drop, attacked scoring one possible hit and several near misses from reported altitudes of 400-1000 feet. The only other bombing attack on this vessel was made by a single TBF which started a fire with some small bombs. Strafing F6Fs poured 17,000 rounds into this vessel, a barge, and a couple of sampans.

The group report evaluates: 1 AK damaged, left blazing, and 2 sampans and 1 lugger damaged.

Apparently the only strike specifically directed at this target was the flight of 3 TBFs, although few more profitable targets were available.

5. Reconnaissance of Outlying Islands

Three photographic Avengers escorted by 4 F6Fs took oblique and vertical coverage of Ngulu on the 25th. The only wooden buildings on the island were thought to be a radio station because of two towers adjoining. Six 500-pounders and strafing destroyed 3 of the 4 or 5 buildings. No other activity was noted and no further flights were made over this island.

Sorol Island, approximately 150 miles southeast of Yap, was scouted by 3 SB2Cs and 3 F6Fs in the afternoon of the 25th. Photographs were taken of the island and in the absence of any shipping targets the Helldivers dropped their six 500-pounders on the small observation tower and hut, which were destroyed.

Sixteen fighters from the CABOT accompanied by 8 F6Fs and 2 TBMs from the HORNET made sweeps over Ulithi and Fais Islands during the afternoon of 25 July. The TBMs and 1 F6F made photographs of the atoll while the fighters strafed. Eleven fighters carrying depth charges dropped them on Asor Island, Ulithi, setting off a fuel dump and destroying several small sheds in the supply area. The mine buildings and railroad on Fais Island were strafed by this flight.

Ulithi was hit by strafing fighters on the 26th and by a strike flight of 4 TBFs and 7 fighters on the 27th. The destruction of the weather and radio station was completed and a pier was destroyed.

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IV. IWO JIMA AND THE BONINS

A. RAID OF 3-4 JULY

1. Fighter Sweep

In the late afternoon fighter sweep over Iwo Jima on 3 July, 62 F6Fs from the 3 carriers of TG 58.1 participated. Fifty-one of them engaged about 60 enemy VF over the target, beginning about 1600, and shot down 49. The 27 HORNET fighters bore the brunt of the attack, taking on nearly 50 VF, and destroying 33. One F6F was forced to land in the water, two are missing, one was surveyed because of combat damage, and 4 others were hit. Eleven HORNET fighters also reported accurate bombing of the runway and revetment areas, resulting in destruction or damage to parked planes.

23 YORKTOWN F6Fs took on about 30 Japs and destroyed 11. One F6F is missing and three were damaged. Twelve BATAAN fighters bombed parked planes, destroying possibly 15-20, then engaged six Jap VF and shot down five without reported loss or damage.

The 23 F6Fs which bombed carried 500-lb. GP bombs fused for .01 delay. This bomb, according to the reports, produced considerable damage. The damage must have resulted from direct hits or very near misses because this bomb, so fused, penetrates 5 to 7 feet before detonating, and makes a crater 8-10 feet deep. The radius of its blast and fragmentation effect against parked aircraft is thus restricted. Instantaneous fusing would be preferable. VF-50 suggested that it could have done more damage with frag clusters. The 500-lb. GP, fused instantaneously, is probably more effective than a single 100-lb. frag cluster; however, the new 500-lb. frag cluster will be a superior weapon for bombing of parked planes by sweeping VF.

2. Strikes on Iwo Jima

Early in the morning of the 4th, Iwo Jima was first swept by 44 VF of TG 58.2. 33 of the F6Fs tangled with 30-35 enemy fighters and shot down 28, plus a bomber. Six F6Fs were shot down or are missing, including four from the CABOT. Bombs were not carried but 22 of the F6Fs strafed parked planes.

Shortly after the sweep the first strike flights from the WASP and FRANKLIN arrived. Their targets were primarily the dispersal areas. A few enemy planes remained in the air but were readily disposed of. Four other strikes were sent against Iwo Jima during the day by the FRANKLIN, three by the WASP, and two by the CABOT. The impression is gained from the action reports that each strike group was usually assigned a definite area to be bombed (an area comprising only a part of one of the two airfields) and that the full program of strikes methodically covered all the areas in succession. This method has the definite advantage of controlling the coverage and degree of saturation of specific areas, preventing the more or less undisciplined "target of opportunity" attacks which have characterized some of our operations. It is subject to the disadvantages that an area may contain several types of targets, for which bomb and fusing requirements may be different. This appeared to be true in the case of these strikes, as some of the squadrons reported attacking runways, dispersal areas and shops in the same strike and with the same types of bombs.

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Bomb selection in general appears to have been excellent. There is little occasion for use of SAP or large GP bombs at airfields; their use was held to a minimum at Iwo Jima -- only nine 1000-lb. GP during the entire day. 100-lb. GP bombs were used heavily in TBFs, largely against dispersal areas but also against dumps, AA, runways and buildings. Almost all SB2Cs carried two 500s and two wing bombs each, for maximum area coverage. FRANKLIN VSB used 100s for wing bombs, WASP VSB used 250s; the reasons for this variance do not appear. Use of the 250s preserves the limited allowance of 100s for use by VTB. Strangely, against the 100 or more parked aircraft very few frag clusters were used, and these few were carried on SB2C wing racks. Frags are an excellent anti-plane load for TBFs. Depth bombs were used by two TBF flights, against area targets including buildings, runways and dispersal areas. Depth bombs are considered inferior against such targets. Nearly equal blast effect and greater fragmentation can be obtained from the 500-lb. GP, and obviously the depth bomb is of no value for cratering and throwing debris.

Bomb fusing, if it was accurately reported, was often such as to not obtain the full potential value of the bombs. VT-13, according to ACA-1 reports, carried all its bombs fused instantaneously. The fair proportion of these bombs which hit runways could have been of little value for cratering, though those hitting dispersal areas must have been effective. VB-13, on the contrary, reported all bombs after the first strike were fused .025. These, while excellent for runways and buildings, were of less value when dropped in parking areas. This illustrates the problem raised by bombing areas containing mixed targets. VB-14 and VT-14 appear to have varied their fusing from strike to strike and to have hit primarily those targets for which their bombs were properly fused.

During the entire day 174 bombers dropped nearly 950 GP or depth bombs (two thirds were 100s or 250s) and 132 20-lb. frag bombs on Iwo Jima, one of the highest bomb-per-sortie averages noted in recent carrier operations. Results of this thorough area average were gratifying: at the end of the strike 80% of the buildings at the southern airfield were destroyed and the remainder probably damaged beyond use; only 14 of over 100 planes shown in photos remained possibly operational. Some of this damage was undoubtedly inflicted in previous strikes, especially that to planes, but much can be attributed to the thorough coverage given by TG 58.2.

It is of interest to note however, the observations of a pilot shot down off the island in an early strike. He reported that enemy planes continued to land and take off between our strikes, up until the time of his rescue at 1400. Since none of these planes were encountered by our strikes, the enemy was probably merely keeping his remaining serviceable planes in the air at a safe distance, awaiting retirement of our force. These observations offer further evidence of the inefficacy of runway bombing, and the desirability of maintaining continuous VF patrols over enemy fields under attack.

FRANKLIN VF fired nearly 400 rockets during the day at parked planes and AA. Dust and smoke made results largely unobservable, but it should be noted that AA losses were considerably lower than in the June attacks. Three planes, out of 284 bombing or strafing, were credited to the very intense AA fire. This may be compared with 11 AA losses in 332 sorties on 15-16 June, when very little attention was paid to neutralizing anti-aircraft positions. Relatively high bomb release altitudes helped hold down losses also. SB2Cs, releasing at 2-3000 feet, had two losses; TBFs generally released at 3500-4000, though some went lower and some were higher. The one lost was from a group which was reported as releasing

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at "2000-4500" feet.

3. VF (N) Heckling at Chichi Jima

Four HORNET VF (N) were sent over Chichi Jima the morning of the 4th, and remained at the target from 0500 to 0700. Three of them bombed from low altitudes, getting one miss on a DD, and two duds on the seaplane base. Two of them encountered nine Rufes in the air, and shot down 7; both F6Fs were damaged and the pilots wounded, but they were able to return.

4. Strikes on the Bonins

In keeping with the lesser importance of the land targets there and the greater value of the shipping present, considerably less effort was expended on the Bonins than on Iwo Jima. YORKTOWN planes made most of the attacks, with some help from HORNET and FRANKLIN. Targets included the seaplane base, the airfield at Chichi, Omura and Okimura towns, and miscellaneous buildings on Chichi, Haha, Ani and Muko Jima. Here too a considerable number of 100 and 250-lb. bombs were used, although VB-1 and VB-2 used 1000-pounders instead of 500s. Bomb fusing exhibited the usual variety, but probably against the light buildings which were the principal targets the instantaneous and the short delays may have been equally effective.

Relatively little attention was paid to AA in these strikes, except for some strafing by VF. Three SB2Cs were lost from the first YORKTOWN strike, one definitely and two probably to AA over Chichi harbor. There were no subsequent losses.

Damage inflicted in these strikes included: Two radio stations and other buildings and a hangar destroyed at Chichi Jima, a fuel dump fired and buildings damaged at Haha Jima.

5. Shipping Attacks

Most of the shipping attacked was in the Bonins, the only ship at Iwo Jima being an LST-type craft which was left beached and afire after an attack by 5 VF and 2 VT from CABOT.

In addition, WASP search planes found and attacked without apparent effect 3 DDs (one originally reported as a CL) 100-plus miles northwest of Chichi Jima, at about 0800. At 1115 a special WASP strike group of 13 VF, 12 VSB and 7 VTB found and attacked a convoy of one LST type vessel and 2 DDs or DEs in the same general area. 6 VF bombers claimed no hits, but all 13 fired a total of 8000 strafing rounds, inflicting considerable damage. The VB claimed 1 hit and 3 near misses on the LST and 1 hit on an escort, out of 45 bombs dropped. The VT claimed no hits with seven 1000-lb. SAP bombs (used apparently because the search plane had reported a CL). CTG 58.2 claimed the LST and one escort probably sunk and another escort smoking and dead in the water. It does not appear that any were actually seen to sink.

The loading of the TBFs on this strike is not believed to have been the most effective available for either the targets found or for the CL expected. It would appear to have been an appropriate occasion for a coordinated bombing-strafing

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ing-torpedo attack.

Ships in the Bonins were found off Chichi Jima, Haha Jima and Ani Jima. They were attacked by a total of 249 sorties including 41 fighter bombers, 58 strafing fighters, 92 SB2Cs and 58 TBFs. They were the targets for 265 500 and 1000-lb. bombs and 220 or 100 to 325-lb. size: Total results as claimed by TG 58.1, which made practically all of the attacks, were as follows:

Sunk: 1 medium AK, 1 small AK, 2 DEs:

Probably sunk: 1 LST, 1 trawler, 4 luggers:

Damaged: 1 large AK, 5 small AK, 2 small AO, 1 DD, 1 LST,
9 Luggers.

Approximately 40 hits were claimed on ships plus nearly 40 near misses, (some sorties in addition reported results unobserved). This number of hits could be expected to have sunk more ships. Also, the number of bombs dropped should have resulted in more hits; 40 hits for 485 bombs is slightly over 8% hits. In justification of the relatively low bombing accuracy it may be stated that visibility was not always of the best, and that some of the shipping was in coves surrounded by hills and heavily defended by AA. However it appears that most attacks were pressed to 2500 feet, and many to release altitudes of 1500 feet. From the 249 sorties 1 VF and 2 VSB were lost to AA, a ratio no higher than in other recent attacks against shipping targets in defended harbors: only 14 planes were reported damaged by AA. Some of the shipping attacked, also was out of the protection of AA.

In considering the tactics and ordnance used, it may be noted that:

- (a) No torpedoes were used, though some suitable targets were available.
- (b) Only 2 TBFs, out of the 249 attacking planes, made masthead attacks. One of them blew up a medium AK with 4 hits out of 4 bombs dropped; the other scored one hit out of 4 bombs dropped on a small AK.
- (c) Fighter bombers used exclusively dive or glide tactics, releasing at 1000 to 3000 feet. They claimed one hit and a dozen near misses out of 34 bombs dropped on targets.
- (d) VB-2 reported all its bombs were fused instantaneously; VB-1 reported half its strike groups carried bombs with non-delay tail fuses, half .025 delay. Instantaneous and non-delay fusing are not useful against merchant ships; they permit no penetration in the case of hits, and give no mining effect in the case of near misses. The best fusing is .025.
- (e) 28, out of 56 TBFs glide-bombing, used bombs with 4-second delay fusing. This fusing is not suitable for drops from 1500-2500 feet; it is intended for use solely for the protection of planes bombing from masthead level. It seriously decreases the potential effectiveness of bombs dropped from higher altitudes.

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- (f) 9 TBFs bombed ships with mixed loads of 100-lb. GPs and incendiary or frag clusters. This resulted from a change of targets from buildings to ships, ordered just before takeoff.
- (g) 9 TBFs were loaded with 2000-lb. bombs. They scored no hits. These bombs are not useful against small merchant vessels. Only 12 TBFs out of 56 carried 500-lb. GP bombs fused .01 or .025 for most effective glide attack on merchant shipping.

The above points may to some extent explain why the shipping attacks displayed something less than optimum efficiency.

B. RAID OF 4-5 AUGUST.

1. Attacks on Iwo Jima.

In the absence of any significant number of enemy aircraft (2 VF were engaged and shot down by the first strike) the planes of TG 58.3 expended very little effort on Iwo Jima on 4 August, concentrating instead on the two ships observed offshore. Thirty tons of well-assorted bombs were dropped on runways, revetments, parked planes and dump areas. Six planes were claimed destroyed on the ground and five damaged; an ammunition storage building was destroyed and a radio station damaged.

Out of only 83 planes over Iwo Jima on the 4th, 2 SB2Cs and 1 F6F were lost to antiaircraft, and 1 F6F is missing. Four planes were damaged by antiaircraft. Bomb releases were largely at 3500 to 4000 feet. Few if any bombs were dropped on AA guns.

No strikes were made on Iwo Jima on the 5th, though 4 VF(N) heckled the airfield from 0500 to 0630.

2. Attacks on Bonins

All attacks on land targets in the Bonins were made on the 5th. Practically none were by full strike groups, most being by small flights from groups giving their primary attention to shipping.

Targets were varied. They included AA positions, radio stations, the seaplane base, and miscellaneous towns and buildings throughout the islands. There was no particular concentration.

Bombs used were largely 500-lb. GP, variously fused, but one flight of SB2Cs carried 1000-lbs. AP bombs against the seaplane base, probably for lack of other types aboard ship. No 100-pounders were used, and very few 250s, pointing again to probable exhaustion of supplies of these useful types. A few frag clusters were dropped on Kitamura town in the absence of incendiaries aboard BUNKER HILL, and 84 incendiary clusters on Omura town and the naval station. Apparently no rockets were available, as none were used. Also, many planes failed to carry their normal full loads, another evidence of bomb shortage.

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Most attacks released bombs at altitudes of 3500-4500 feet, some reporting release as high as 5000 to 6000 ft. In spite of these high release altitudes, and the obvious disinclination to make minimum altitude bombing attacks on land or shipping targets, bombs with 4-second delay fusing were carried by a third of the bombing sorties.

Damage inflicted to land targets included: 29 buildings destroyed at Haha Jima, a large fire at Omura town, fires at the seaplane base, and a radio station afire.

Two VF were lost to AA on the last strike.

3. Shipping at Iwo Jima:

There were only two ships at Iwo Jima on 4 August, both cargo vessels of the new LST type. The following table summarizes the attacks on them by Air Groups 8 and 19, of TG 58.3:

<u>Plane Type</u>	<u>Attack Sorties</u>	<u>Bombs Dropped</u>	<u>Hits Claimed</u>	<u>Near Misses</u>	<u>Altitude of Release</u>
F6F	55	19	0	2	1500-3500
SB2C	44	128	2	6	2000-4000
TBF	18	47	0	5	1700-4000
TOTALS	117	194	2	13	

The two hits were divided between the two ships. One sank; the other, already beached by the Japs, was left smoking.

CTG 58.3 commented that "the attacks on shipping clearly demonstrated that our bombing accuracy is well below an average standard of efficiency".

The ships were near shore during some of the strikes, and the land AA (which had not been neutralized) may have to some extent affected the accuracy of the attacks, though the release altitudes indicate many attacks were pressed close. One VF was lost to AA.

4. Convoy Northwest of Chichi Jima

Previous to the strike a convoy had been reported by a submarine, heading for the Bonins from Japan. TG 58.1 planes found a convoy, probably the same, about 10 miles northwest of Chichi just before noon on the 4th, heading generally north but trying to take advantage of low cloud cover when threatened with attack. It appears to have consisted of about 5 medium AKs, 5 or 6 DDs or DEs, and ten to twelve small vessels of LCI type.

Three strike groups were launched against the convoy by HORNET and FRANKLIN. The first strikes split up, and some of their planes attacked shipping at Chichi; the remainder appear to have done little damage to the convoy. 15 strafing VF hit two DDs, causing explosions on one and smoke on the other; fires were started on one AK, and an LCI-type craft was sunk. 14 VSB scored no hits. 6 glide-bombing VT claimed two hits (with instantaneously fused 500 pounders), on DDs. One torpedo hit on an AK was claimed; a second torpedo was dropped prema-

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turely. The amount of damage inflicted is not known, but in later strikes 5 AKs and 5 escorts were reported still heading northwest.

In the second strike 6 VF strafed, sinking a small vessel; 23 VSB claimed 3 hits and 7 near misses (mostly instantaneously fused) out of 31 bombs dropped on AKs; 7 glide-bombing VTBs and one masthead attacker claimed no hits. 5 AKs were still proceeding north when the third strikes arrived.

In the third strike it is impossible to ascertain from the reports which carrier group struck first; obviously there was duplication, and obviously each group did not inflict all the hits and damage claimed, but the convoy was demolished. 16 FRANKLIN VF claim to have exploded 2 DDs by strafing, to have left another DD proceeding at slow speed and smoking, and to have sunk 3 LCI-type craft. 12 HORNET VF strafed heavily but their accomplishments were reported most inadequately. 29 VSB scored 4 hits and 7 near misses on AKs, causing at least two to lose way and start to settle. HORNET VT dropped 7 torpedoes and claimed three hits, one on an AK which sank stern first 5 minutes later, another on a second AK, and the third on a DD which was left dead in the water and was sunk, by our own DDs during the night. Two CABOT VT, attacking with HORNET's, claimed one or two possible hits on AKs. FRANKLIN VT reported 5 AKs and 3 DDs still afloat when they attacked; they appear to have claimed 9 hits with 9 torpedoes, distributed among 4 AKs. One was claimed to have broken in half and sunk, another to have sunk in 3 minutes and the other two to have sunk later.

Regardless of the number of hits, it is clear that 4 of the 5 AKs and 2 of the 5 DDs or DEs were sunk by the third strike, with one DD crippled, a fourth DD/DE and a fifth AK probably damaged. This was Navy anti-shipping attack at its best - a degree of perfection seldom achieved, as previous sections of this report and previous Analyses have shown. It should be clear that the most devastating element here was torpedoes and the effective attack was one in which VF strafers, VSB dive bombers, and VTB attacked as well coordinated teams. This formula should be repeated more often.

The balance of the convoy was fairly well disposed of during the night by cruisers and DDs from the carrier screen, which steamed north at 30 knots and sank the crippled DD, a medium AK, a small AK, 2 sampans and 3 LCIs, less than 500 miles from Tokyo. Searchplanes the following morning strafed another escaping DD 225 miles from Tokyo (the planes went 50 miles closer); this was probably the only major unit which escaped. The same searchplanes also disposed of a covering flying boat.

Overall statistics on the convoy actions follow:

	<u>Attack Sorties</u>	<u>Bombs Dropped</u>	<u>Hits Claimed</u>	<u>Near Misses</u>	<u>Altitude of Release</u>
VF	53	-	-	-	-
VSB	66	87	7	19	2000-4500'
VTB Glide	13	33	2	-	2000-3000'
VTB Masthead	1	3	-	-	200'
VTB Torpedo	20	20 T	13	1-2 poss. hits	200-400'

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The following comments may be made on ordnance used against the convoy:

(a) No VSB carried wing bombs, probably because of the shortage of small bombs in TG 58.1. Chances of hits were thereby reduced.

(b) Over 80 percent of the bombs dropped by VSB were reported to have instantaneous fusing, reducing lethal effect to a minimum. The remainder were all SAPs, not the most effective bombs against AKs and DDs.

(c) All bombs dropped by VT were reported fused either instantaneous or 4-second, neither fusing being appropriate for glide attack.

5. Other Bonins Shipping

A reported CL (possibly a DD) 5 miles from Chichi was attacked by 11 FRANKLIN VSB in the first strike on the 4th. One hit was claimed. 8 VF bombed and strafed without results. 4 FRANKLIN VT missed it with torpedoes. Two CABOT VF found it later in Takinoura Bay, Ani Jima, and scored 1 hit and 1 near miss in attacks at 300 feet. On the next day it was not seen by any TG 58.1 strike or search planes, and was claimed as probably sunk. The bombs which hit it were properly fused, a 1000-lb. GP fused .025, and a 500 pounder fused 4 seconds for masthead attack.

A beached DD/DE at Ani Jima (possibly the same ship) was attacked the following day by 8 VF bombers, 17 VSB and 6 VTB, from BUNKER HILL. No hits were claimed, but some near misses were reported.

Eight FRANKLIN VTB with torpedoes searched for shipping on the morning of the 5th, but found none at sea except one small AK southwest of Chichi Jima. Apparently not wishing to make runs on the numerous ships in harbor, they all attacked this ship, and all missed. Their claim that "all torpedoes hooked 60° to the left" does not agree with other comments in the squadron's reports.

Other attacks were made on a considerable volume of small and medium-sized shipping in harbor at Chichi Jima. These attacks are summarized below:

	<u>Attack Sorties</u>	<u>Bombs Dropped</u>	<u>Hits Claimed*</u>	<u>Near Misses</u>
F6F	87	43	3	1
SB2C	76	170	14	8
TBF Glide	20	62	4	3
TBF Torpedo	7	7	2	2 poss. hits
TBF Masthead	2	4	-	-

*For some sorties results were unobserved.

These attacks were about equally divided between TGs 58.1 and 58.3; most were made on 5 August. TG 58.1 claimed the following results: 1 DD, 3 sampans, and 2 barges sunk; 2 small AKs, 3 luggers probably sunk; 3 beached medium AKs and some small craft damaged. TG 58.3 claimed one DE, one small AK and 2 luggers sunk, a small AK probably sunk, and numerous vessels damaged. There is probably some duplication between the two groups.

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Attacks on shipping at Chichi were marked by the same peculiar bomb fusing as in other shipping attacks. All bombs dropped by VF (from 2000 to 6000 feet) were reported fused instantaneous or 4 second; all bombs dropped by HORNET and FRANKLIN VSB were fused for 4-second delay (BUNKER HILL and LEXINGTON properly used .01 or .025); most of the VTB used the same inferior fusings.

6. Notes on Torpedo Attack and Reporting.

VT-13 reported in a summary of its operations that of 14 new drag-rin torpedoes dropped, all ran true; that of 7 old type MK 13 Mod. 2A Torpedoes, 2 ran true, 3 hooked, and 2 ran in circles. This does not agree with the previously mentioned report that all of 8 old type torpedoes dropped against a small AK hooked. The performance of our weapons cannot be checked if squadrons submit inconsistent reports.

VT-2 reported 6 hits out of 11 torpedoes (whether they were new type was not specified). One was reported to have hooked, one dropped prematurely from high altitude, two ran straight but missed, one was unobserved.

VT-31 used drag-ring torpedoes (reported as Mod. 5) and reported all ran satisfactorily. Two or three possible hits were claimed.

In all, 15 hits and 3 or 4 possible hits were claimed for 39 torpedoes carried. This is believed optimistic; 12 of the hits were claimed on 4 medium AK in the one convoy. The facts remain that these 4 AKs were definitely sunk, that DD was crippled, that a large AK and possibly a DD were probably sunk in harbor, all by the 39 torpedo sorties. This is a higher rate of tons sunk per sortie than the dive and glide bombers can claim.

Two torpedo-dropping planes were lost to AA, one in the attack on the convoy and one of three making unsupported runs against shipping in harbor. The latter loss is chargeable not to torpedo attack as such, but to uncoordinated attack, apparently the result of poor communications.

Only VT-31 reported depth settings used on torpedoes (6 feet). Range and altitude at point of release were not in all cases clearly stated in the reports, or performance of torpedoes. There was no indication as to whether torpedo aiming cameras were used to check claims of hits.

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V. AIR SEA RESCUE OPERATIONS

Air sea rescue incidents arising out of carrier based aircraft combat operations during the months of July-August, 1944, are covered by this report. The following two tables present the overall results for this period. In the first fast carrier operations are distinguished from those of CVEs; and in the second the results are broken down according to the geographical areas where the incidents occurred.

Type of Ship	INCIDENTS					PERSONNEL			
	Total	Impossible	Possible	Successful	% Successful	Total involved	Possible	Rescued	% Rescued of Those Possible to Rescue
Fast Carriers	91	32	59	44	76	155	105	67	64
CVE's	9	4	5	5	100	19	14	10	71
TOTAL	100	36	64	49	78	174	119	77	65

Location	INCIDENTS					PERSONNEL			
	Total	Impossible	Possible	Successful	% Successful	Total involved	Possible	Rescued	% Rescued of Those Possible to Rescue
Bonins	33	9	24	10	42	50	38	14	37
Palau-Yap	15	4	11	11	100	26	19	16	84
Marianas	52	23	29	28	96	98	62	47	76
TOTAL	100	36	64	49	78	174	119	77	65

An INCIDENT is any case where a plane is lost at sea or on land, or is missing. Incidents are classed as POSSIBLE unless it appears certain that there is no survivor. Missing planes are classed as POSSIBLE INCIDENTS and charged against air sea rescue although actually there may have been no survivor to rescue. An incident is considered as successful if one or more of the air crew are recovered.

It will be noted that, while the record of successful incidents in the Marianas and in the Yap-Palau area was excellent, there having been only one impossible incident out of 40 which did not result in a rescue, the percentage of successful rescues in the Bonins was only 42%. This striking difference can be counted for in part by the fact that in the Bonins, a considerable number of planes were reported missing after fighter sweeps in which they had been lost in a melee near the target. These losses were included in the number of POSSIBLE

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incidents, although in many cases there may have been no survivor. It is also worth noting that of the 40 POSSIBLE incidents in the Marianas-Palau-Yap area 20 were bail-outs or water landings made in the vicinity of the carrier formation whereas in the Bonins there were only 4 of such occurrences out of the 24 POSSIBLE incidents.

A tabulation showing the number of successful incidents and personnel rescued by each rescue agent appears below.

Agency	DD	SS	Other Surface Craft	Dumbo	Aircraft	Unknown*	Total
Personnel Saved	49	7	3	-	8	10	
Successful Incidents	31	5	2	-	6	5	

* UNKNOWN represents incidents in which, although a rescue was reported, the reporting unit failed to mention the rescue agency.

24 of the 31 successful incidents in which the rescue agency was a destroyer occurred in the immediate vicinity of the carrier formation. These situations present the simplest air sea rescue problem. Nevertheless, even excluding these incidents it will be noted that destroyers effected more rescues than any other agency.

The table below tabulates the results for this period, eliminating incidents occurring in the immediate vicinity of the formation. It is believed that these figures give a clearer picture of the degree of success that is being achieved in the developing field of air sea rescue.

INCIDENTS					PERSONNEL			
Total	Impossible	Possible	Successful	% Successful	Total Involved	Possible	Rescued	% Rescued of Total Possible to Rescue
76	36	40	25	63	130	77	36	47

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Results of rescue operations in the Marianas and Bonins for this period compared with those for the month of June in the table below.

	June			July and August		
	Marianas	Bonins	Total	Marianas	Bonins	Tc
Possible Incidents	60	11	71	29	24	
Successful Incidents	30	0	30	28	10	
% Successful	50	0	43	96	42	
Personnel Possible to Rescue	93	17	110	62	38	1
Personnel Rescued	41	0	41	47	14	
% Rescued	44	0	37	76	37	

A. DETAILED SUMMARY OF JULY - AUGUST OPERATIONS

TARGET	U. S. COMBAT SORTIES							BOMBS ON TARGETS		ENEMY AIRCRAFT		OWN COMBAT LOSSES		
	TOTAL	VF				VB	VT	% of		En-gaged	Des-troyed	VF	VB	VT
		TOTAL	Bomb	Strafe	Combat			TONS	TOTAL					
SAIPAN (1-8 July)	359	272	-	270	-	-	87	40	.9	-	-	-	-	1
<u>GUAM, TOTAL*</u>	<u>7534</u>	<u>3906</u>	<u>2285</u>	<u>1476</u>	<u>4</u>	<u>1723</u>	<u>1905</u>	<u>2661</u>	<u>60.3</u>	<u>4</u>	<u>2</u>	<u>9</u>	<u>12</u>	<u>8</u>
6-17 July	1371	741	360	350	4	270	360	466	10.6	4	2	2	7	1
18-21 July	4427	2076	1034	959	-	1336	1015	1606	36.4			5	4	4
22 July - 8 August	1736	1089	891	167	-	117	530	589	13.3			2	1	3
<u>TINIAN, TOTAL</u>	<u>831</u>	<u>481</u>	<u>115</u>	<u>346</u>		<u>81</u>	<u>269</u>	<u>205</u>	<u>4.6</u>			<u>4</u>	<u>1</u>	<u>2</u>
1-22 July	42	39	-	39		-	3	1	-			2	-	-
23-24 July	457	244	107	137		81	132	155	3.5			2	1	1
25-30 July	332	198	8	170		-	134	49	1.1			-	-	1
ROTA (6-28 July)*	612	356	219	128	1	110	146	167	3.8	1	1	-	2	1
MISC. MARIANAS	40	28	10	10	8	-	12	14	.3	9	9	1	-	1
PALAU	980	437	221	174	8	295	248	401	9.1	12	5	4	5	2
YAP	640	312	55	253	4	189	139	225	5.1	3	1	-	2	1
ULITHI, ETC.	47	37	11	26	-	3	7	4	.1	-	-	-	-	-
IWO JIMA, 3-4 July	361	187	43	90	87	91	83	120	2.7	100	81	11	2	1
IWO JIMA, 4-5 August	87	53	38	11	10	18	16	30	.7	2	2	2	2	-
BONINS, 4 July	148	75	38	32	6	41	32	55	1.2	11	9	1	3	-
BONINS, 4-5 August	175	89	41	43	6	48	38	57	1.3	2	2	2	-	-
SHIPPING, 4 July	293	120	52	68	-	106	67	135	3.1	-	-	2	2	-
" 25-28 July	186	92	57	35	-	66	28	76	1.7	-	-	1	-	1
" 4-5 August	535	222	80	132	4	214	99	223	5.1	4	2	3	4	3
GRAND TOTAL	12,828	6,667	3,265	3,094	138	2,985	3,176	4,413	100.0	148	114	40	35	21

* Operations for 1-5 July included in previous report.

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B. SUPPLEMENTAL DATA ON COMBAT SORTIES

1. Fast Carrier and CVE Operations, by Targets and Days.

DATES	CV-CVL OPERATIONS					CVE OPERATIONS			
	No. of Ships		COMBAT SORTIES			No. of Ships	COMBAT SORTIES		
	CV	CVL	Guam	Rota	Tinian		Guam	Tinian	Saipu
July:									
1-5	2-3	2-4	473	200	-	6-8	-	32	290
6-12	4	3	512	239	-	4-6	120	8	69
13-17	4	2	376	166	-	2-5	363	-	-
18-19	7	5	1956	66	-	5	106	1	-
20	7	5	1335	-	-	5	63	1	-
21	7	5	838	-	-	7	129	-	-
22	1	2	199	-	-	9	47	-	-
23	1	2	-	-	185	10	147	50	-
24	1	2	40	15	127	10	149	95	-
25-28	1	2	233	92	-	10	361	267	-
29-31	1	1-2	52	-	-	9-10	185	65	-
1-8 Aug.	1	1-2	302	-	-	?	21	-	-
TOTALS			6316	778	312		1691	519	359

NOTE: The Guam and Tinian landings were on the 21st and 24th, respectively.

2. Daily Volume of Operations by Carriers

Fast carrier combat activity, as usual, came in brief spurts of heavy flight operations, followed by lulls. 4 CVs and 2 CVLs, for example, flew 736 bat sorties against Iwo Jima and the Bonins on 4 July (over 160 sorties per CV then flew only 15-30 combat sorties per CV per day, and 5-15 per CVL, for the ceeding 13 days.

The only sustained heavy activity by fast carriers was against Guam fr the 18th through the 21st; the following average combat sorties over target w flown by CVs and CVLs per day, giving an idea of the sustained offensive capabilities of the carriers in the absence of air opposition.

	<u>TARGET SORTIES</u>	
<u>Date</u>	<u>Per CV</u>	<u>Per CVL</u>
18	132	21
19	130	16
20	177	19
21	106	20

Against Palau and Yap, offensive sorties were on the order of 110-130 day per CV for the two principal days of attack, the 26th and 27th, after whi two of the CVs retired, and four, after a rest of several days, each flew 90- sorties per day for two days in the Bonins. The ESSEX and 2 CVLs which remai in the Marianas, flew similar heavy schedules from the 22nd through the 25th, tapered off to an average of 15-25 sorties per day per carrier for the follow 14 days.

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The CVEs maintained a more steady volume of combat sorties. From 14 to July the 5 to 10 CVEs in the area generally flew 12-20 (average 15) combat sorties per day per CVE, reaching a maximum of 24 on the 24th.

C. ORDNANCE EXPENDITURES AND LOADINGS

1. Total Ordnance Expended on Targets, by Type, 1 July - 8 August*

TYPE OF TARGET; TYPE OF SHIP	G.P.					S.A.P.		A.P.	350#	100#	100#	Tor- pedo
	100#	250#	500#	1000#	2000#	500#	1000#	1000#	DB	Inc.	Frag	
Land Targets	8652	1220	6201	1512	170	364	635	102	1491	2020	1185	-
Shipping	233	254	582	284	15	68	48	-	35	43	24	39
Total	8885	1474	6783	1796	185	432	683	102	1526	2063	1209	39
CVs (9)	4947	1400	4566	1602	140	362	625	90	579	1660	1099	34
CVLs (7)	1739	74	1192	119	24	70	7	12	103	132	110	5
CVEs (11)	2199	-	1025	75	21	-	51	-	844	271	-	-

*Excluding TGs 58.3 and 58.4 for 1-5 July. Bombs jettisoned are not included.

2. Comparison with Previous Periods.

OPERATIONS	PERCENT (BY WEIGHT) OF TOTAL ORDNANCE DROPPED ON TARGET							
	100# GP	Inc. Clus.	Frag. Clus.	TOTAL SMALL	250, 500 and DB	1,000 2,000	Tor- pedo	
July-August	10	3	2	15	51	33	1	
June	8	4	3	15	48	36	1	
Palau-Hollandia	12	3	3	18	48	32	2	
January-February	12	1	3	16	53	29	2	

During July and August there was a slightly increased expenditure of 100-lb. and 500-lb. GP bombs and depth bombs, at the expense principally of 250s, 2000s, 500-lb. SAPs, frags and incendiaries, as compared with June. There was no net gain in favor of smaller bombs. The decreased use of the magnesium incendiaries is probably desirable, as they are not the best incendiary for targets of the type available. The decreased use of frags is not understood, nor their absence from CVE bomb loadings, as they have considerable utility against personnel and open or revetted gun positions, the principal targets during this period. They also, by their greater quantity per sortie, increase the chance of securing direct hits within revetted positions.

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3. Comparison of Expenditures and Loadings

The unbalance between expenditures and loadings for various types of bombs, noted in June, continued in July and August, as indicated by the following table. The bomb loading figures used are those established for the operation by Third Fl and not the BuOrd allowances.

TYPE OF SHIP	PERCENT OF INITIAL LOADINGS EXPENDED ON TARGETS, 1 JULY-8 AUGUST											
	GP					SAP		AP	Frag.	Inc.	DB	Torp
	100	250	500	1000	2000	500	1000	1000	Clus.	Clus.		
CVs (9)	106	108	146	82	86	36	55	9	68	63	45	10
CVLs (7)	124	*	103	38	38	28	2	5	29	17	20	4
CVEs (11)	196	*	64	*	21	*	*	0	*	*	74	0

NOTE: No 1600-lb. APs were included in the loading or were used.

* No bomb loadings established for this operation for this type.

As in June, it should be noted that all carriers probably did not carry the loadings established, and some carriers exhausting some types of bombs were unable to replenish and were forced to use less suitable types. This latter factor is aptly illustrated by the following table which shows the progressive substitution of large GP, SAP and AP bombs for small GPs as the operations progressed and supplies of the latter were exhausted.

DATE, TARGET	PERCENT OF TOTAL WEIGHT OF BOMBS ON TARGET						
	100,	500	1000,	500,	Incend.,	DB,	TOTAL
	250	GP	2000	1000	Frag	Torps.	
	GP		GP	SAP-AP			
3-4 July, Bonins	23	47	23	1	4	2	100
5 July - 8 Aug., Marianas	15	30	28	18	5	4	100
25-28 July, Palau-Yap	4	42	33	8	10	3	100
4-5 Aug., Bonins	8	37	30	10	3	12	100

The strikes of 3-4 July were by carriers freshly replenished at Eniwetok. Those in the Marianas were by two groups initially well stocked, plus the two groups which had already drawn heavily on their stocks of small bombs in the Bonins; the length and weight of the attacks on Guam forced most carriers to use less useful types of bombs at the end. Some carriers, anticipating shortages of GPs, rationed them and used SAPs against all types of targets throughout the operation, particularly against Guam. The Palau and August Bonins operations were by carriers which were well depleted; there were few targets which called for the SAP and AP bombs, and some carriers complained of the shortage of GPs.

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Referring back to the first table in section 3, it should be stated that the figure of 146 percent utilization for CV 500-pounders does not necessarily reflect a greater demand for this bomb than for 100s and 250s; it may reflect only that the difficulty of replenishing bombs in the Marianas resulted in carriers obtaining greater supplies of this convenient size than of the smaller bombs. It is believed that if more 100s and 250s had been loaded aboard, they could have been used profitably. The light use of 100s and 250s in the later operations, relative to the heavy use on 3-4 July, supports the conclusion.

The relatively high expenditures of 1000-lb. SAP bombs by CVs probably reflect in part shortages of 500 and 1000-lb. GPs, rather than any great need for this type of bomb. Most were used against targets where penetration was not required. If there is any doubt that SAP bombs were used largely as substitutes for GPs, it should be dispelled by the fact that about 85% of the 500-lb. and 70% of the 1000-lb. SAPs used against Guam were reported to have instantaneous or non-delay fusing - fusing which would not be used if the armor-piercing qualities of the bombs were a consideration. The June operations, wherein only 25% of the CV CVL allowance of SAPs was used, are believed to represent the actual requirement more closely, though even in June some carriers used them for lack of GPs. It is suggested that if supplies of all bombs were unlimited, more 100s, 250s, and 500-lb. GPs would have been used, and substantially less SAPs and APs.

The foregoing figures and discussion suggest the effect which availability of bombs may have on selection of the most efficient bomb type for each target. They suggest also that in the light of recent experience larger loadings of 100 to 500-pound GPs, at the expense of SAPs and APs, may be desirable to insure optimum bomb selection. Commander Air Force, Pacific Fleet, does not feel fully qualified on the basis of present evidence to suggest specific changes in loading for particular operations, nor feel it desirable at present to recommend changes in the basic BuOrd allowances, in view of the rapidly changing nature of carrier targets and the advent of new bombs whose relative usefulness has not been determined. It is hoped, however, that the above analysis may be helpful to Fleet Commands in loadings for future operations, and of interest to others. The following additional discussion may also be useful in this connection.

In considering replacement of SAP and AP bombs by GPs, the necessity of having an ample reserve supply for use in encounters with the enemy battle fleet must be taken into account. Our present SAP-AP allowances originated in times when task forces included only one or two CVs, and when the standard VSB complement was 36. Current needs for large quantities of GPs had not developed. The present policy of concentrating carriers makes it doubtful that less than 6 CVs and 4 CVLs would be exposed to engagement with any major part of the Japanese fleet, or any force of less than 2 CVs and 1 CVL to any small force of enemy heavy units. Under present loadings forces of these sizes would carry the following SAP, AP and torpedo ordnance (parentheses indicate the number of sorties required):

	<u>6 CV, 4 CVL</u>	<u>2 CV, 1 CVL</u>	<u>Deckloads Required</u>
500 SAP	1004 (251 VTB)	324 (81 VTB)	4 per CV and 2 per CVL
1000 SAP	936 (936 VSB)	297 (297 VSB)	10½ per CV, plus VF from CVLs
1000 AP	792 (396 VSB)	252 (126 VSB)	4½ per CV, plus VF from CVLs
1600 AP	-	-	-
Torpedo	288 (288 VTB)	90 (90 VTB)	4 per CV and CVL
TOTALS	3020 (1871 Sorties)	963 (594 Sorties)	8 VTB, 15 VSB

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Both the number of bombs available, and the number of deckloads required to utilize them, seem rather excessive for the enemy heavy forces likely to be encountered, particularly if heavy GP bombs are also used in some strikes.

The table below shows the ordnance which would be available, and the sorties and deckloads required to carry it against enemy naval forces, if changes were made in the current loadings as follows:

	<u>CV</u>	<u>CVL</u>
500-lb. SAP	108 (-25%)	36 (no change)
1000-lb. SAP	60 (-52%)	15 (-67%, not an efficient TBF load)
1000-lb. AP	24 (-78%)	0 (-100%, not an efficient TBF load)
1600-lb. AP	24 (increase)	0 (no change)

and if, in addition, 40% of the SAP bombs allowed were earmarked for use against land targets:

	<u>6 CV, 4 CVL</u>	<u>2 CV, 1 CVL</u>	<u>Deckloads Required</u>
500 SAP	480 (120 VTB)	152 (38 VTB)	2 per CV, 1 per CVL
1000 SAP	252 (252 VSB)	81 (81 VSB)	3½ per CV
1000 AP	144 (72 VSB)	48 (24 VSB)	1 per CV (2 if loaded 1 per p
1600 AP	144 (144 VSB)	48 (48 VSB)	2 per CV
Torpedo	288 (288 VTB)	90 (90 VTB)	4 per CV and CVL
TOTALS	1308 (876 Sorties)	419 (281 Sorties)	6 VTB, 6½ VSB

The table indicates that allowances modified as noted above provide for an ample number of strikes against all types of armored warships, and a reasonable balance between VTB and the reduced VSB deckloads. They are not necessarily the optimum loadings, but may serve to provide a measure of minimum SAP-AP requirements.

Turning from the consideration of GP-versus-AP loadings, the table at the beginning of section (3) suggests two additional points:

(a) CVLs might well be used more extensively for dropping incendiary clusters. Independent/incendiary strikes on poorly protected area targets make an ideal employment for CVL air groups. CVLs might also be given more strikes requiring frag clusters, or be permitted to exchange some of their frags for 100-pound GPs.

(b) CVLs do not appear to use a very large proportion of their 1000-lb. GP (45); these are an inefficient TBF load, and are seldom used by VF.

CVE bomb loadings have recently been revised radically in substantial accordance with the data on their bomb use in the Marianas operations.

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D. OWN COMBAT LOSSES, JULY-AUGUST

AREA	TOTAL COMBAT SORTIES	TOTAL	OWN COMBAT LOSSES, BY CAUSE					
			Anti-aircraft		Enemy A/C		Other Causes	Missing, Unknown
			Known	Prob.	Known	Prob.		
<u>Marianas</u>								
F6F	4228	12	4	-	-	-	5	3
FM	815	2	2	-	-	-	-	-
SB2C	1914	15	6	-	-	-	9	-
TBF	2419	13	5	-	-	-	6	2
<u>Iwo Jima-Bonins</u>								
F6F	746	21	6	1	4	7	1	2
SB2C	518	13	10	3	-	-	-	-
TBF	335	4	2	1	-	-	-	1
<u>Palau-Yap</u>								
F6F	878	5	4	-	-	-	1	-
SB2C	553	7	6	-	-	-	1	-
TBF	422	4	3	1	-	-	-	-
<u>TOTAL</u>								
F6F	5852	38	14	1	4	7	7	5
FM	815	2	2	-	-	-	-	-
SB2C	2985	35	22	3	-	-	10	-
TBF	3176	21	10	2	-	-	6	3

Losses were considerably lower during the July-August operations than in June, despite the 50 percent greater number of combat sorties.

In part the lower losses reflect decreased enemy aerial opposition. Eleven losses are credited to enemy VF in July as against 43 in June. 114 enemy planes (95% of them VF) were destroyed in the aerial combats wherein 11 losses were sustained; the loss ratio was not so greatly in our favor as in June.

The battering given Marianas gun positions in June and early July decreased AA losses over these targets in July and August to less than 2/10 of one percent of the attack sorties flown, as against over one percent in June. AA losses at Iwo Jima and the Bonins were also lower, 1 1/2% as against approximately 3 percent in June; AA losses were 3/4 of one percent at Palau and Yap. In part the improved record at the latter targets reflects a tendency to bomb from higher altitudes, and in part a weakening of enemy defenses by repeated strikes, but undoubtedly improved tactics have contributed to some extent. The use of rocket VF is believed to have had some effect on AA at Iwo Jima; a greater use of smaller bombs may also have been beneficial in securing more hits on guns. There is evidence that air groups, increasingly aware of the AA problem, are concentrating more on coordinated attack, with VF attacking AA in advance of the bombers.

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Again the SB2C has proven the plane most vulnerable to AA. Losses in July and August amounted to over 8/10 of one percent of sorties, 3 times the rate for the F6F and double the rate for the TBF.

Losses from other than enemy action increased during July. Seven were the result of own bomb drops. Two VB were damaged beyond repair by fragments from their own bombs, and similar damage to a VT was believed to have been from the same cause. One VT was reported to have crashed because of the instantaneous explosion of a 500-lb. bomb with a 4-5 second delay fuze, and another blew up in mid-air, presumably because of a premature bomb explosion; it was carrying incendiary and frag clusters. A fourth VT was abandoned in the air when an armed 100-lb. bomb stuck in the bomb bay. One VF was lost to fragments from its own bomb hit. In connection with the reported recent withdrawal of the highly useful frag clusters from carrier use, it should be noted that according to reports received, only one plane's loss was attributed to possible premature frag explosions, out of 200-400 sorties dropping 2400 clusters in the June-August operations.

Six SB2Cs, 3 F6Fs and 2 TBFs were lost through plane failure while on combat missions. Two losses (collision) were charged to pilot error. One SB2C ran out of fuel. There were no losses to own AA or own VF.

E. OVERALL SUMMARY OF MARIANAS OPERATIONS, 11 JUNE-8 AUGUST

The tables on the following pages provide summary statistics on the carrier operations as a whole, for the entire period.

Over 21,000 combat sorties were flown, and nearly 7,000 tons of bombs were dropped on targets, from carrier bases, during the two months of these operations. 909 enemy planes were destroyed in aerial combat, 51 by ship AA, and 276 on the ground. At least 30 were captured in serviceable or repairable condition. Probably the enemy lost nearly 1300 aircraft in all as a result of these operations.

Our losses of carrier aircraft on combat missions were 334; of these 204 were definitely lost to enemy action (54 in aerial combat) and 19 more were missing from unknown causes. The remaining 111 were lost because of combat exigencies.

The following table shows where the sorties and the bombs went:

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TARGET	COMBAT SORTIES					BOMBS DROPPED	
	TOTAL	% of Total	VF	VB	VT	TONS	% of Total
Saipan	2570	12.1	1462	454	654	690	9.9
Guam	9891	46.7	4951	2446	2494	3542	50.9
Tinian	1917	9.1	1133	293	491	532	7.7
Rota	1239	5.9	741	181	317	348	5.0
Pagan, etc.	477	2.3	277	95	105	175	2.5
TOTAL MARIANAS	16,094	76.1	8,564	3,469	4,061	5,287	76.0
Iwo Jima	766	3.6	431	175	160	232	3.3
Bonins	424	2.0	217	97	110	147	2.1
Palau	980	4.6	437	295	248	395	5.7
Yap, Ulithi, etc.	687	3.3	349	192	146	229	3.3
Enemy Fleet	216	1.0	85	77	54	109	1.6
Other Shipping	1424	6.7	642	486	296	562	8.0
Interceptions	565	2.7	542	5	18	-	-
GRAND TOTAL	21,156	100.0	11,267	4,796	5,093	6,961	100.0
CV-CVL Total	17,545	83.0	8,638	4,796	4,111	6,154	88.4
CVE Total	3,611	17.0	2,629	-	982	807	11.6

It will be noted that the assault and ground forces at Guam received the benefit of nearly four times the number of attack sorties and five times the bomb tonnage, in bombing preparation and direct support, devoted to targets at Saipan. This unbalance was undoubtedly considerably offset by the heavy naval gunfire and ground artillery support at Saipan, which was probably greater than at Guam; naval guns fired over 10,000 tons of projectiles at Saipan. Also, much of the Guam effort was against airfield runways in June, far in advance of the landings.

At Saipan land-based aircraft contributed relatively little to support of troops. P-47s flew about 160 sorties and dropped about 20 tons. At Guam, Saipan-based P-47s and B-25s flew 170 sorties and dropped 110 tons. These activities were a small percentage of the carrier attack effort in each case. At Tinian, however, land-based planes flying the few miles from Saipan provided half the total air attack effort. P-47s flew about 1450 sorties, B-25s a few, and 520 tons of bombs were dropped (probably all 500-pounders and Napalm tanks) to nearly equal the carriers' 1917 sorties and 532 tons. Since only 40 percent of the carrier attacks on Tinian were flown during July, most of the immediate pre-invasion aerial preparation and direct air support were handled by the P-47s. Most of the carrier attacks were in June, incident to the neutralization operations supporting the Saipan occupation.

About one-fifth of the carrier combat sorties during the two-month period were flown against targets outside of the Marianas area, half against Iwo Jima and the Bonins, half against Palau and Yap. The former strikes, four in all, were among the most profitable, sortie for sortie, in that they

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resulted in the destruction of over 350 enemy aircraft in the air and on the ground and a considerable volume of shipping. Long-range diversionary forays against enemy bases off the beaten path represent one of the most profitable employments for carrier forces. The Palau-Yap strikes were much less profitable, but should more properly be considered a preliminary to the September operations than an integral part of the Marianas operations.

The considerable part played by CVEs in the Marianas is indicated in the last line of the above table. Preliminary indications are that they accomplished an even greater proportion of the work in the September operations.

In the tables on the following page total aircraft losses, own and enemy, are listed.

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TOTAL COMBAT SORTIES, AND ENEMY PLANES DESTROYED BY CARRIER FORCES, 11 JUNE-8 AUGUS

PLANE TYPE	COMBAT SORTIES	COMBAT LOSSES	ENEMY PLANES DESTROYED										TOTAL
			VF	VB-VT	VBM	F/P	VP	VR	U/I	S/E	U/I	T/E	
F6F	10,003	141	568	205	36	25	11	1					846
FM	1,259	11	14	19	10								43
F4U(N)	5	-	1		5								6
SB2C	4,054	97	2										2
SBD	742	12		2									2
TBF	5,093	73	3	1	5	1							10
TOTAL	21,156	334	588	227	56	26	11	1					909
DESTROYED BY SHIP AA *			5	32	11							3	51
DESTROYED ON GROUND:													
Saipan						3	11	2				1	17
Tinian			13		6			5		2		2	28
Guam			3	3	6	1				37		8	58
Rota										9			9
Pagan					1							2	3
Iwo Jima			1		23			1		61		16	102
Chichi Jima				1	2	7	1			1			12
Palau						4	1			26		8	39
Yap			2	4	1					1			8
TOTAL			19	8	39	15	13	8		137		37	276
GRAND TOTAL			612	267	106	41	24	9		137		40	1,236

June data for FMs have been revised upward on receipt of additional reports.

* From reports of CTF 58 and CTF 51.

TOTAL CARRIER COMBAT LOSSES, 11 JUNE-18 AUGUST, BY CAUSE

PLANE TYPE	TOTAL	ENEMY AA*	ENEMY A/C*	OWN FORCES*	OWN BOMBS	OTHER CAUSES@	SPECIAL#	MISSING, UNKNOWN
F6F	141	59	44	4	1	9	13	11
FM	11	5	3	2	-	1	-	-
SB2C	97	41	5	-	2	10	37	2
SBD	12	8	1	-	-	-	3	-
TBF	73	37	1	1	4	4	20	6
TOTAL	334	150	54	7	7	24	73	19

* Including probables and planes jettisoned from damage resulting from these causes.

@ Plane failure or pilot error at or near target on combat missions (excluding deck crashes or take-off crashes), and fuel exhaustion.

Fuel exhaustion and deck crashes in fleet action of 20 June only.

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The data indicate the overwhelming superiority of the F6F over Japanese fighters in combat. 568 enemy fighters were shot down by F6Fs, against 44 known losses, and possibly an additional 4 to 6 missing, in combat. The indicated loss ratio is thus over 11 to 1 in the F6F's favor. If other types of enemy planes are included, the ratio raises to 17 to 1.

Losses to enemy AA were nearly three times as great as losses to enemy aircraft. With respect to sorties, SB2C losses to AA were highest (1.0%), with TBF losses considerably lower ($\frac{3}{4}$ of one percent), and fighter losses slightly less ($\frac{2}{3}$ of one percent).